KNOWLEDGE AND CLINICAL PRACTICES RELATED TO PERIOPERATIVE PRESSURE INJURIES IN A MIDDLE EASTERN HOSPITAL

by

Alida Margaretha Martins

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Supervisor: Mary A. Cohen

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DECLARATION: PLAGIARISM

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ABSTRACT

Perioperative pressure injuries (PIs) resulting from inadequate safety precautions when positioning a patient in the operating room (OR) for a diagnostic or surgical intervention, may result in temporary or permanent damage to skin, nerves and organs and are considered an adverse event or a critical failure in patient safety. An injury of this nature may increase a patients' length-of-stay in a care facility from 5-8 days or longer with increased costs, the risk of facility-acquired (nosocomial) infections and litigation. Knowledge and practice (KAP) of PI prevention and management in OR suites can be influenced by the nurse's level of experience and education. The aim of this study was to determine the nurses' and anaesthetic technicians' knowledge and clinical practice for the prevention of PIs in the OR.

An online self-administered survey was distributed by Stellenbosch University's internet technology service called SunSurvey using CheckBox©. The total population of nurses (N=45) and anaesthetic technicians (N=10) employed in the OR department in a Middle Eastern hospital were approached to participate. Reliability and validity were verified during the pilot, with nursing experts and in consultation with a statistician.

The Health Research Ethics Committee of the University of Stellenbosch approved the protocol (S20/07/182). Permission was granted from the hospital executives. Informed consent was obtained from the participants online prior to the activation of the survey.

The data was analyzed with the guidance of the statistician on IBM Statistical Product and Service Solutions software (SPSS27©) and are presented in frequencies and illustrated in tables. The sample size was small; therefore, the 2-sided Fisher Freeman Holten exact test was used to determine the differences in proportions, and to identify trends.

The participants knowledge and clinical practice demonstrated a shortfall in two categories of nurses, including the anaesthetic technicians, which may be attributed to the inconsistency of in-service training or continuing professional development opportunities in the research setting. It is recommended that regular training opportunities are developed to enhance or maintain evidence-based knowledge and clinical skills.

Keywords

Anaesthetic technicians, clinical practice, knowledge, perioperative pressure injuries, skills

OPSOMMING

Perioperatiewe drukseer beserings (PDB) word veroorsaak deur onvoldoende veiligheids maatreels wanneer ‘n pasient geposisioneer word in die operasie saal vir diagnostiese of chirurgiese intervensies. Dit mag lei tot tydelike of permanente skade aan die vel, senuwees en organe en word beskou as ‘n nadelige gebeurtenis of kritiese mislukking m.b.t. pasient veiligheid. ‘n Besering van die aard kan ‘n pasient se duur van verblyf in ‘n versorgingseenheid verleng met 5 tot 8 dae of langer, met gepaardgaande kostes, die risiko van fasiliteit verworwe (nosokomiale) infeksies, en litigasie. Kennis en praktiese vaardighede (KAP) van PDB voorkoming en hantering in die operasie saal kan beinvloed word deur die verpleegkundige se vlak van ondervinding en opleiding. Die doel van die studie was om verpleegkundiges en narkose tegnici se kennis en kliniese vaardighede in die voorkoming van PDB in die operasie saal te bepaal.

‘n Gestruktureerde aanlyn vraelys is versprei deur Stellenbosch Universiteit se internet tegnologie genaamd SunSurvey m.b.v Checkbox©. Die totale bevolking verpleegkundiges (N=45) en narkose tegnici (N=10), werksaam in ‘n Midde Oosterse hospitaal se operasie saal is versoek om aan studie deel te neem. Betroubaarheid en geldigheid is verseker deur ‘n voortoets, met verpleegdeskundiges, en in konsultasie met ‘n statistikus.

Die Gesondheid Navorsing Etiese Komitee van die Universiteit van Stellenbosch het die protocol goedgekeur (S20/07/182). Toestemming is verleen deur die hospitaal direkteure. Ingeligte toestemming is verkry van die deelnemers aanlyn, voordat hulle die elektroniese vraelys kon aktiveer en beantwoord.

Die data is ontleed met hulp van ‘n statistikus deur ’n IBM Statistiese Produk en Diens Oplossings sagteware (SPSS27©), wat grafies en in frekwensie tabelle geïllustreer word. Die steekproef was klein, derhalwe is die Fisher Freeman Holton presiese toets gebruik om die proporsionele verskille te bepaal en tendense te identifiseer.

Tekortkominge in die deelnemers se kennis en kliniese praktyk is uitgewys in twee aspekte van verpleegkunde sowel as narkose tegnici. Dit word toegeskryf aan die inkonsekwentheid van indiensopleidings kursusse of voortdurende opleiding in die navorsingsopset. Daar word aanbeveel dat gereelde opleidingsgeleenthede geskep moet word om bewys-gebaseerde kennis en kliniese vaardighede op te skerp of volhoubaar te maak.

Sleutelwoorde: Narkose tegnici, kliniese praktyk, kennis, perioperatiewe druksere, vaardighede

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ACRONYMS AND ABBREVIATIONS

OR: Operating room

PU: In this study, PU is the abbreviation for an injury that presents as intact skin or an open ulcer.

CHAPTER 1: SCIENTIFIC FOUNDATION OF THE STUDY

1.1 INTRODUCTION

Iatrogenic injuries during the peri-operative period, such as pressure injuries to skin and nerves from prolonged ischaemia, are known to adversely affect the patient's quality of life. Furthermore, they are a significant cause of morbidity and mortality following a prolonged hospital stay (Neo, Koo, Chew, Png, Lacuesta *et al.*, 2021:223). The American OR Nurse (AORN) guidelines on optimal patient positioning to prevent injuries are used in the study setting. Each guideline highlights important elements and it includes images, implementation steps and the rationale why each step is important to promote safety when positioning a patient (AORN Guidelines for Perioperative Practice, 2017:1-6). However, evaluating the individual's risk for ischaemic damage and planning interventions prior to the commencement of treatment, is crucial. High risk patients are those with a low and high body mass index

This chapter provides an overview of the scientific foundation of the study including, the problem statement, the aim and objectives and the rationale.

1.2 PROBLEM STATEMENT

Preventative measures for PIs are essential, and internationally published guidelines are available. However, the attention paid to this aspect of patient safety in the study setting appears to be inconsistently applied by the nursing staff and anaesthetic technicians, a situation which has resulted in PIs requiring further patient treatment, including a prolonged hospital stay. The cause could be ascribed to the lack of knowledge and clinical skills of the staff who originated from countries where the training they received is inconsistent with the standard operating procedures in the study setting. Furthermore, the researcher observed that frequent in-service training on PI prevention might not have been adequate for the needs of the institution.

1.3 RESEARCH QUESTION

LoBiondo-Wood and Haber (2010:28) emphasize that the research question underpins the research study and influences the design and approach selected to meet the objectives of the study. The research question for this study was: What are the nurses' knowledge and clinical practice in the prevention of PIs in perioperative patients in the OR department of a Middle Eastern hospital?

1.4 RESEARCH AIM

The aim was to determine the nurses and anaesthetic technicians' knowledge and clinical practice about the prevention of PIs in perioperative patients in the OR department of a Middle Eastern hospital.

1.5 RESEARCH OBJECTIVES

- To determine the knowledge of the ORNs on the prevention of PIs
- To determine the practices of the ORNs on the prevention of PIs
- To identify whether a relationship exists between educational opportunities and their knowledge of departmental guidelines.

1.6 RESEARCH METHODOLOGY

The methodology selected to answer the research question will be briefly described below, and in detail in Chapter 3.

1.6.1 Research design

A research design is defined as "the overall plan for addressing a research question, including strategies for enhancing the study's integrity (Polit & Beck, 2018:416)." Thus, to answer the research question and meet the objectives, an exploratory, descriptive cross-sectional quantitative design using an online self-report survey was used. An exploratory descriptive study is defined by Polit and Beck (2018:743) as a method used to explore the characteristics of an existing phenomenon for the purpose of using the data to evaluate current conditions in which to plan for improvements. A cross-sectional research design measures data at one point in time Polit and Beck (2018:400). In this study, the survey gathered data on the participant's knowledge of pressure ulcers and their actions for pressure ulcer prevent and treatment.

1.6.2 Population and sampling

A study population is defined by Polit and Beck (2018:739) as the entire group of individuals who share the characteristics central to the research aim. The accessible population for this study were the three categories of nurses and the anaesthetic technicians who were employed in the OR department in the Middle Eastern hospital during the data collection period. The total population were: N=45 registered nurses of different levels of training and N=10 anaesthetic technicians. Since a sample represents a selected percentage of the individuals or units within a population (Polit & Beck, 2018:743) and the population in the research setting was small, the sample was all-inclusive of the population. This was recommended by the biostatistician Prof T. Esterhuizen.

1.6.2.1 Inclusion criteria

The inclusion criteria are individuals or units who have specific characteristics to be included as the target population (Polit & Beck, 2018:250). For this study, all three categories of registered nurses and the anaesthetic technicians on duty in the study setting during the survey period (3 weeks) were included.

1.6.2.2 Exclusion criteria

Staff absent from the study setting during data collection were excluded.

1.6.3 Instrumentation

An on-line self-administered published survey by Sutherland-Fraser, McInnes, Maher and Middleton (2012:25) (Appendix D) was used to measure the self-reported knowledge and practice of perioperative PIs in the study setting. The survey consisted of five sections with 41 questions: Section 1 measured the demographic data of the participants (5 items). Sections 2-5 included questions to assess the participants current knowledge and clinical practice on the prevention and management of perioperative PIs. Finally, educational opportunities and the participants knowledge of departmental guidelines were survey. Likert scales ranged from 1- 15 options depending on question.

1.6.4 Pilot test

A pilot test is defined by Polit and Beck (2018:412) as a "small-scale study or trial run" prior to the main study to assess feasibility. For this survey, the pilot aimed to evaluate the utility, of the survey in the study setting. The online mechanism of collecting data was evaluated for its ease of use, namely, the clarity of the instructions for providing consent, and the completion of the instrument. The test was conducted with 3 ORNS employed in the central sterilizing department and were selected according to their employment categories: one specialist trained OR nurse, one with OR nursing experience and one with limited OR experience. The pilot participant's survey data was excluded from the main study. Following the feedback from the pilot participants, no changes were needed. The results were excluded from the main study. In addition, the pilot test assisted the researcher in familiarizing herself with the CheckBox© software for retrieving data for analysis.

1.6.5 Reliability and validity

An important criterion for the reliability of an instrument is to determine if the instrument is free from measurement error (Polit & Beck, 2018:742). The Cronbach alpha coefficient is commonly used to measure multiple item scales for reliability and internal consistency (Polit & Beck, 2018:725).

Validity is a quality criterion that determines whether an instrument actually measures what it was intended to (Polit & Beck, 2018:747). Content validity ascertains the degree to which a multi-item instrument includes a suitable set of applicable items "reflecting the full content of the construct domain being measured (Polit & Beck, 2018:724)." The instrument was assessed by experts in PI research in Australia and the United Kingdom (Prentice, Stacey & Lewin, 2003:93) for ease of reading, comprehension of the questions and whether the survey was manageable. The survey was then piloted at a hospital, following which changes to the order of the questions were implemented. Nurse educator experts who were practising in the original research peri-operative setting validated the content in the study, and no other validity and reliability tests were conducted. In this study, it was further evaluated for its relevance to the subject domain by two operating room master's degree prepared nurses, of whom one was the supervisor of this study.

1.6.6 Data collection

The study settings human resource manager asked the participants for permission to provide their email addresses to the researcher. Three weeks were allocated for data collection, with the pilot survey done on 22 January 2021 and the main survey performed 27 January 2021-15 February 2021. The survey was completed by the participants by on their cellular telephones, or a computer available in the department in a private place. All participants had free data access as provided in the hospital. Once the survey had been concluded it was automatically stored on SunSurvey. The OR staff were reminded to participate in the survey and the survey closed after the allocated three weeks, with the analysis following.

1.6.7 Data analysis

Data was imported from the CheckBox software© into IBM SPSS27 for analysis with the guidance of the statistician. The sample was small, therefore only descriptive analyses were conducted. The researcher was guided by the statistician on the application of the Fisher Freeman Holten exact test to determine the relationships between categories of staff and to identify trends, for example the participants responses to the knowledge statements.

1.6.8 Ethical considerations

The importance of protecting the human rights of the participants at all stages of the research process were meticulously observed (Polit & Beck, 2018:83). In addition, the World Medical Association's Declaration of Helsinki principles it is declared that "it is the duty of physicians who are involved in medical research to protect the life, health, dignity, integrity, right to self-determination, privacy, and confidentiality of personal information of research subjects (Kong & West, 2013:np)." Following

ethical approval from the Health Research Ethics Committee (HREC) (S20/07/182) of Stellenbosch University (Appendix A) and permission was granted from the institution (Appendix B) and the director of nursing (Appendix C), after which the study commenced. All participants were required to read the online letter of introduction, following a request to provide their full consent to participate (Appendix D). The documents explained the purpose of the study and that their participation was voluntary, anonymous and secret. If they decided to abandon the survey without completing it, the data would still be analysed as it is not possible to remove data from the software. The small risk of unauthorised access to the data by hackers was declared and they were requested not to reply to a group email but rather email the researcher individually should they have any concerns.

The privacy and anonymity of the facility where the research was conducted was protected as was that of the participants. Therefore, no identifiers are revealed in the research report, including no reference to the name of the hospital when referring to the hospital policies. The data will be stored on the researcher's personal computer for 5 years to which only the researcher has access. The survey responses are stored on the university's data base to which the student will not have access after graduating.

1.6.9 Limitations

The limitation of this study is that the sample was small as it was conducted in one hospital that is part of a larger organisation. Despite this, the results may be generalisable to the other hospitals in the group who abide by the same guidelines followed in the research setting.

1.7 CONCEPTUAL FRAMEWORK

Patricia Benner's theory of nursing practice (Benner, 2001:13) and the Knowledge, Attitude and Practice Framework (KAP-O) (Rav-Marathe, Wan & Marathe, 2016:6) underpinned this study. Benner's theory was applied to identify whether the categories of staff's level of knowledge and their years of nursing experience who participated in this study indicated a need for ongoing training in the strategies for perioperative PI prevention. Benner describes the five stages of nurse development, namely, novice, advanced beginner, competent, proficient and expert. In addition, to the Benner model, two constructs from the KAP model were used in this study. The knowledge construct measured the participants empirical and ethical approach to PI by evaluating their knowledge of pressure injuries, patient positioning, patient assessment and risk. The practice construct measured the participants individual skill in initiating action for a patient-centred staging/grading of pressure injuries, risk assessment, management interventions and self-directed reflection on learning needs.

1.8 OPERATIONAL DEFINITIONS

Anaesthetic technicians are professionals who work under the direction of licensed anaesthesiologists and as part of the anaesthesia care team to design and implement anaesthesia care plans. They accompany the patient before, during and after anaesthesia to ensure quality and continuity of care (Edgcombe, Baxter, Kudsk-Iversen & Thwaites *et al.*, 2019:2).

Continuing professional development (CPD) or in-service training refers to "… the process of ongoing education and development of healthcare professionals, from initial qualifying education and for the duration of professional life, in order to maintain competence to practice and increase professional proficiency and expertise (Mlambo, Silén & McGrath, 2021:2)."

Knowledge: This term is defined by Mantzoukas and Jasper (2008:319) as an unbiased, form of knowledge that is obtained in clinical practice from evidence that should influence decisions on appropriate patient care.

Nurses in the study setting are classified according to their years of experience in specific areas: PN1 are called staff nurses and are qualified with a degree or diploma from their country of origin and are specialist trained such as those employed in the OR as scrub sisters, nurse managers and educators. PN 2 nurses are qualified with a degree or diploma and who have limited experience in a specialist unit such as the OR.

Practice: Practices or behaviours are the way individuals respond to a given situation. In practice, the obtained knowledge and the comprehension of a problem/disease is seen in the way individuals respond to a given situation. In this study the knowledge and practice on correct positioning of patient's peri-operatively to prevent pressure injuries will be obtained to determine if an educational intervention is needed to influence the practice and behaviour of the peri-operative team (Rav-Marathe, Wan & Marathe, 2016:4).

Perioperative period: Perioperative period is a term used to describe three distinct phases of any surgical procedure, which includes the preoperative phase, the intraoperative phase and the postoperative phase. The perioperative team works in all three phases (Phillips, 2017:497).

Pressure Injuries (PI): Pressure injuries are localized damage to the skin and underling soft tissue, usually over bony prominences or are related to a medical condition such as diabetes mellitus. The injury can present as intact skin or an open ulcer (Sutherland-Fraser *et al.*, 2012:8).

Pressure ulcer(s) (PUs): Pressure injuries are localized damage to the skin and underling soft tissue, usually over a bony prominence or related to a medical condition such as diabetes mellitus. The injury can present as intact skin or an open ulcer and is referred to in this study as a pressure ulcer (PU) (Sutherland-Fraser *et al.*, 2012:8).

Registered nurses: A registered nurse has completed a bachelor's degree or a three- or four-year diploma in nursing. In this study, registered nurses in the research setting means that they are registered and licensed to practice in their country of origin and are registered with the Saudi Commission for Health Specialities on employment in the Middle East.

1.9 RATIONALE

Proper patient positioning optimizes surgical exposure and serves to reduce neurological and muscular injury by providing additional padding to alleviate excessive pressure on tissue and bony prominences. Furthermore, correct positioning avoids extreme stretching of limbs or compression as this might result in temporary or permanent damage to skin, nerves and organs (Ginsburg, Pape, Heilbronn, Levin & Cher, 2018:12). Any injury sustained by a patient following a surgical procedure is considered an adverse event or a critical failure in patient safety that may result in a prolonged length of hospital stay with increased costs and possible litigation (Bohnen, Mavros, Ramly, Chang, Yeh, *et al.*, 2016:1120; Bonnaig, N., Dailey, S., Archdeacon, 2014:1135). Patient factors such as age, gender, height, body mass (underweight, overweight or obese) (Peixoto, Ferreira, Felix, Pires, Barichello, *et al.*, 2019) and the presence of comorbidities such as diabetes, should alert the team that the patient is at risk for PI (Bouyer-Ferullo, 2013:111).

Surgical outcomes are not only dependent on the surgeon's skill but also on team communication and standardization of care processes (Bohnen, Mavros, Ramly, Chang, Yeh, *et al.*, 2016:1119). Positioning the patient is a shared responsibility among team members in the OR, meaning that the anaesthetists, the anaesthetic technicians, the primary surgeon and nursing staff are jointly responsible for ensuring that all precautions are implemented (Lin, Hey, Lau, Tan, Thambiah, Lau, Kumar, Liu & Wong *et al.*, 2017:1730); (Woodfin, Johnson, Parker, *et al.*, 2018:325).

In the study setting where the researcher is employed, the standards of the American Nurses Credentialing Center's Commission on Accreditation and the Joint Commission's International Accreditation Standards are implemented (ANCC, 2020:26; JCI,2017:7). The purpose of the standards is to optimise patient care by providing guidelines to accredited hospitals. The OR staff are required to implement these guidelines to ensure a safe environment and to prevent any harm to patients. However, the researcher observed that the standards are not consistently implemented and that

rigorous continuing professional development and in-service training is inconsistent that may have contributed to recent PIs.

1.10 DURATION OF THE COLLECTION OF DATA

The pilot test commenced 22 January 2021 and data collection took place 27 January until 15 February 2021. An additional week was added following a reminder to participate via CheckBox©.

1.11 CHAPTER OUTLINE

Chapter 1 describes the foundation of the study and includes the rationale, aim and objectives. The research methodology and conceptual framework was outlined.

Chapter 2 includes the literature review regarding a perioperative team's knowledge and clinical practice for PI and incorporates the conceptual frameworks that underpinned this study.

Chapter 3 provides details on the research methodology selected to optimally answer the research question, aim and objectives.

Chapter 4 presents the analysis of the data, followed by the interpretation and discussion of the results of the study.

Chapter 5 provides the conclusion and recommendations.

1.12 SUMMARY

Proper patient positioning optimizes surgical exposure and serves to reduce neurological and muscular injury (Ezeamuzie, Darian, Katiyar, *et al.*, 2019:10080). By providing additional padding ref to alleviate excessive pressure on bony prominences and by avoiding extreme stretching of limbs or compression, the incidence of temporary or permanent damage to skin, nerves and organs may be averted. However, the pre-operative assessment of patients at risk is crucial in order to implement a care plan appropriate to nature of the surgery and its duration. As observed by the researcher, the peri-operative nurses and anaesthetic technicians in the study setting appear to inconsistently apply the hospital's guidelines for PI prevention and management, a situation that may result in future adverse events.

1.13 CONCLUSION

This chapter presents an introduction and rationale for the study. The research question, aim and objectives and the methodology were delineated, including the ethical considerations and the

conceptual frameworks. Chapter 2 explains the literature on peri-operative patient safety for the prevention and management of PIs.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

A literature review provides one with current theoretical and scientific knowledge about a research topic, enabling one to critically synthesize what is known and not known about a research topic (Polit & Beck, 2018:408). The aim of this literature review was to determine what current international published guidelines recommend for perioperative pressure injury prevention. Articles and research reports published by nurses and medical professionals were reviewed from 2010-2020.

2.2 SEARCH STRATEGY

The purpose of the literature review in this study was to examine what is known and unknown about patient positioning in the OR department to prevent pressure injuries (PIs) perioperatively and to determine the OR teams responsibilities and accountability in positioning of patients. The identification of the risks related to the common positions used in the study setting was deemed important in order to evaluate the knowledge and practices of the OR nurses about such risk factors. Furthermore, OR staff should be familiar with the classification of PIs as defined in international guidelines to prevent these, or manage the patient who has incurred an injury (Edsberg *et al.*, 2016:588).

The literature search was conducted using computer databases such as EBSCO Publishing, PubMed and Medline, using Boolean operators with the following keywords: safety culture, knowledge, attitude and practices, ergonomics of OR nurses, surgical positioning and risks.

In addition, reference lists of relevant articles were examined. Some articles were more than 10 years old but were included as the information they provided was important to answer the research question in this study. Full text English language articles published in peer-reviewed journals were reviewed as well as international guidelines for best practice (Polit & Beck, 2017:250).

2.3 QUALITY OF INTRAOPERATIVE PATIENT CARE

The defining attributes of patient safety include the avoidance of preventable adverse events, including the protection of patients from harm or injury while enhancing the collaborative efforts by individual healthcare (Ingvarsdottir & Halldorsdottir, 2018:951). The quality and standard of care given to a patient during surgery may influence the outcome of the operation. Surgical outcomes and post-operative complication rates are dependent on the surgeon's skill, the OR dynamics, team communication and standardization of care processes.

2.3.1 Importance of teamwork

A team is defined by its members' interactions, interdependence, and shared goals. In preoperative care, as with all of heath care, there is a close link between teamwork, communication and safety. Teamwork includes the notion of creativity, since people have different skills and may possess dissimilar perspectives of every activity. Therefore, any activity that involves team work would benefit from the various creative thoughts and inspirations of different people. "Creativity thrives on diversity" (Woodfin, Johnson, Parker, Mikach, Johnson & McMullan, 2018:325).

Multidisciplinary teamwork is core to safe surgical positioning. Safe positioning requires coordination among all OR department staff members and is the responsibility of the entire team (Woodfin *et al.*, 2018:325). The goal is to optimally position the patient to provide adequate access to the operating site for the surgical team without compromising the patient. The perioperative team members are required to use available technology to help them to position the patients with ease or to safely adapt resources in the best interest of the individual (Blomberg, Bisholt & Lindwall, 2018:417). Furthermore, a good knowledge and understanding of anatomy and physiology is needed to implement safe positioning practices to prevent nerve, skin and tissue injuries and haemo-dynamic instability in patients (Woodfin *et al.*, 2018:325).

Positioning the patient is a shared responsibility among the anaesthetists, the primary surgeon and nursing staff are jointly responsible to ensuring that all precautions to prevent PIs are implemented (Lin, Hey, Lau, Tan, Thambiah, Lau, Kumar, Liu & Wong, 2017:1730).

Proper patient positioning during surgical reduces neurological and muscular injury by avoiding excessive pressure points, stretching or compression (Ginsburg, Pape, Heilbronn, Levin & Cher, 2018:12). Injuries resulting from inadequate safety precautions when positioning a patient in the OR for a diagnostic or surgical intervention may result in temporary or permanent damage to skin, nerves or organs. Patient factors such as age, sex, height, weight (thin or obese), the presence of comorbidities such as diabetes (Bouyer-Ferullo, 2013:111) and surgical factors such as the approach, procedure type and anticipated operative time must be carefully taken into consideration prior to the procedure, to prevent an adverse event (Lin et al., 2017:1730). Iatrogenic injuries are considered an adverse event and depending on the long-term outcome of the injury, it may be considered a critical failure in patient safety. Injuries can result in a prolonged length of stay in hospital with increased costs and possible litigation (Bohnen et al., 2016:1120; Bonnaig, Dailey & Archdeacon, 2014:1135). Therefore, early identification of perioperative PI risk is recommended and assessment of the patient's risk factors is imperative (Peixoto *et al.*, 2019:8).

2.4 INTERNATIONALLY PUBLISHED SAFETY STANDARDS FOR PERIOPERATIVE PATIENT CARE

This study was conducted in a hospital where the standards of the American Nurses Credentialing Center's Commission on Accreditation (ANCC) and the Joint Commission's International Accreditation Standards (JCI) are implemented (ANCC, 2020:26; JCI,2017:7). These accreditation bodies aim to improve standards of care by providing guidelines to the accredited hospitals. The OR department staff are required to implement these guidelines to ensure a safe environment and to prevent any harm to patients.

2.4.1 Joint Commission International accreditation standards for hospitals

The Joint Commission International (JCI) provides six international patient safety goals (IPSG) to promote and ensure patient safety (JCI, 2017:7) of which goals 1, 2, 4 and 6 pertain to the OR.

2.4.1.1 Goal 1: Patient identification

This goal emphasises the importance of patient identification where the patient, procedure and operation site are verified.

2.4.1.2 Goal 2: Effective communication.

A "Team talk" is recommended before the start of operations, which is important when the position of the patient is discussed to provide the best access for surgery. Trial positioning is advisable and occurs before the patient is anaesthetized. The patient is able to converse with the team members and provide insight into possible limited range of motion and their ability to lie comfortably in the expected position.

2.4.1.3 Goal 3: Handover Communication

This takes place when a patient is transferred from the OR to the recovery area. The ISBAR tool is used to ensure a comprehensive hand over without misinterpretations and misunderstandings. The ISBAR tool is used to ***I****dentify* the patient when handing over the patient from the OR to the recovery room; communicate the ***S****ituation* of the patient regarding surgery that was done, including the patient's position during surgery, the skin integrity before the surgery and the postoperative skin status; the ***B****ackground* is given regarding the history before surgery, for example a bruise was noticed on the left thigh before starting surgery, skin was intact after removing the diathermy plate and on transfer of the patient the hospital bed no skin shearing had occurred. The ***A****ssessment* is done and co-confirmed to determine if the patient is haemodynamically stable as the chosen position may result in physiological changes. ***R****ecommendations* are made to evaluate the pressure points and the skin's integrity on handover and to observe for any loss of function following the positioning of the patient (Muller, Jurgens, Redaelli, Klingberg, Hautz & Stock, 2018:2).

2.4.1.4 Goal 4: Checklists to ensure safe surgery

To improve patient safety and quality outcomes according to Simon (2010:6-9) health care professionals use multiple methods to reduce patient harm and eliminate medical errors. One method frequently implemented is the checklist. It is important to note that the effectiveness of a checklist depends on its quality and thoroughness, acceptance and compliance by staff, and a strong culture of safety in the organization. Along with improving patient safety, checklists create a greater sense of confidence that the process is completed accurately and thoroughly. The use of Checklists can have a significantly positive impact on health outcomes, including reduction of complications, injuries and other patient harm.

2.4.1.5 Goal 6: Patient risk of falling

International patient safety standard six aims to decrease the risk of patient harm resulting from falls. The Morse Fall Scale for adults and the Humpty Dumpty Scale for paediatrics are used to determine a patients' risk of falling and provides interventions to be implemented if patients are at risk of falling. A yellow ID band on a patients' wrists and a yellow Humpty Dumpty fall sticker on a patient's folder alerts the perioperative team that the patient is at risk of falling (JCI, 2017:7).

Apart from the JCI goals, American OR Nurse (AORN) guideline on how to position a patient is used in the study setting. Each step of the guideline highlights important elements and it includes images, implementation steps and the rationale why each step is important to promote safety when positioning a patient (AORN Guidelines for Perioperative Practice, 2017:1-6).

2.5 CLASSIFICATION OF PRESSURE INJURIES

Surgical patients have an especially high risk of developing intra-operative PIs if they were immobile prior to a surgical intervention and this can be exacerbated by protracted pressure during surgery and in the recuperation period (Riemenschneider, 2018:142). Riemenschneider further identifies that PI that occurs up to 72 hours after surgery, is associated with prolonged pressure during surgery. Further risk factors to PI are the length of surgery, whether planned or unplanned, and an hypotensive and hypothermic phase during the surgery (Alavi, 2017:18) and Alshaya, Alsayegh, Alshaya, *et al.*, (2017:152) add to this list the prevalence of diabetes mellitus. Prior wound assessment is important to identify existing skin changes due to peripheral vascular disease ulceration and incontinence-associated dermatitis. The aetiology of a PI can start from a friction injury where the force on the tissue (shear) may contribute to PI development (Alavi, 2017:12). This can occur on transfer of the patient onto, and off the operating table or while optimising the patients position for surgery (Croke, 2019:13).

Classification of PIs are described by the stage or grade of injury to skin that commonly overlays bony prominences. According to (Edsberg *et al.*, 2016:587) the following criteria are presented:

2.5.2 Stage 1

The skin colour has changed but does not include purple or maroon discoloration, since these commonly signify a deep tissue pressure injury (Edsberg *et al.*, 2016:587).

2.5.3 Stage 2

The wound bed is pink or red, moist and can include an intact or ruptured serum-filled blister and excludes moisture associated skin irritation due to for example, faecal or urinary incontinence (Edsberg *et al.*, 2016:590). Most common areas where this injury occurs is the pelvis and heel.

2.5.4 Stage 3

The wound presents with full-thickness skin loss and adipose tissue is visible in the ulcer and granulation tissue and slough and/or eschar may be visible in the ulcer. Epibole is present, meaning that the wound edges may be dry, callused or hyperkeratotic. Fascia, muscle, tendon, ligament, cartilage, or bone is not exposed. The following areas of the body do not have subcutaneous adipose tissue and are therefore excluded from the classification of Stage 3 PIs: the bridge of the nose, ear auricle, occiput, and malleolus (Edsberg *et al.*, 2016:591).

2.5.5 Stage 4

Full-thickness skin and tissue loss is present with exposed or directly palpable fascia, muscle, tendon, ligament, cartilage, or bone in the ulcer. Slough and/or eschar may be visible. Epibole (rolled edges), undermining, and/or tunnelling often occur (Edsberg et al., 2016:592).

2.6 SAUDI ARABIA CENTRAL BOARD FOR ACCREDITATION OF HEALTHCARE INSTITUTIONS

In Saudi Arabia, the Central Board for Accreditation of Healthcare Institutions (CBAHI) National Hospital Standards (2015:3) states that their mission is to continuously improve the safety and quality of healthcare services in the Kingdom of Saudi Arabia. CBAHI accredits hospitals after an on-site assessment and monitoring, education, publications and consultation services.

2.6.1 Responsibilities of the OR department team

Nurses' responsibility and accountability is governed by the Kingdom of Saudi Arabia's Saudi Commission for Health Specialties, (SCFHS, 2017:1) and their scopes of Service specified by the employer (Hospital, 2018:1-7). The OR team consists of nurses, surgeons, anaesthetists and anaesthetist's assistants. To be competent and work as a team is the expectation from a responsible

OR department team. Hospital wide competencies and unit-based competencies are assessed on first employment of the new employee, and thereafter annually. Monthly unit-based in-service training, lectures, courses and workshops are provided both internally, and at other venues external to the hospital (Hospital, 2018:1-7).

2.7 PATIENT POSITIONS IN THE STUDY SETTING AND PRESSURE INJURY RISK

As mentioned, the OR department team positions patients to provide adequate access to the operating site for the surgical team without compromising the patient (Woodfin *et al.*, 2018:326). The positions adopted for surgery in the study setting are supine, Trendelenburg, lithotomy, lateral and prone. In the study setting the Norton Scale is used to assess the patient's risk status for pressure injuries. It is a pen and paper document that is completed prior to the patient's admission to the OR.

2.7.1 Supine position

The supine position is the most frequently used position for surgical procedures on the throat, thoracic, abdomen, and certain orthopaedic procedures. This position causes extra pressure on the skin over the occiput, scapulae, olecranon processes, sacrum, coccyx and the calcaneus. In this position, one or both arms may be abducted on arm boards or tucked in next to the patient's body. In this position strain may occur to the patient's back and therefore the hips and knees should be slightly flexed by placing a pillow under the knees or configured on the operating table into a slight beach chair position (Lin *et al.*, 2017:1731). Perioperative team members can follow the **BACKS** mnemonic to assist with supine positioning: ***B**ack* of the head is supported by a gel head ring; the ***A**rms* are not abducted more than 90 degrees; ***C**overing* the olecranon process with a gel arm support; ***K**nees* are supported on pillows and ***S**ecuring* the arms with arm board straps to prevent falling or stretching (Woodfin *et al.*, 2018:327). Patients in advanced stages of pregnancy or with a large abdominal mass, may be at risk for aortocaval compression and hypotension in the supine position. Beds are tilted towards left side to prevent aortocaval compression. Arms should be positioned to minimize brachial plexus and ulnar nerve injuries. Guidelines for arm positioning are based on anatomical considerations. It is recommended that arms should not exceed 90 degrees abduction to avoid stretching the brachial plexus across the head of the humerus in the axilla. Ulnar nerve injury can be avoided by eliminating or minimizing pressure on the ulnar nerve in the ulnar groove at the elbow. This is done by supination, or a neutral position and should be individualized based on the patient's anatomy (Guo, Zhao, Zhao, *et al.*, 2019:82). Arms should be adducted along the patient's sides, with the palms facing the patient's torso. When arms are abducted, they should be padded on arm boards level with operating mattress to avoid impingement at the edge of the mattress. Brachial plexus injury has been associated with median sternotomy for cardiac surgery. Injuries are usually to the lower

roots of the brachial plexus, which may be stretched when sternal retraction rotates the first rib (Welch, 2018:5; Burlingame, 2017:227).

Bony prominences in contact with the operating table mattress, arm boards and head supports are at risk for skin pressure damage and should be padded (Bouyer-Ferullo, 2013b:110). Prolonged pressure on the occiput can cause alopecia while the heels and sacrum are at risk for pressure sores, especially in long procedures. Protective measures include pillows that can be placed under knees and special heel protectors under heels. Feet should be supported without pressure on the Achilles tendon and without the knees hyperextended. The head should be supported in a gel donut shaped pad, to eliminate occiput pressure. Extension of the head is often required for thyroid and parathyroid surgery. A roll or inflatable pillow is placed under the patient's shoulders after intubation, to extend the neck for exposure for surgery. The patient's ability to extend the head should be assessed preoperatively. Excessive neck extension can cause neck pain, vertigo, headache and postoperative nausea (Welch, 2018:6).

2.7.2 Trendelenburg Position

The Trendelenburg position moves the patient's abdominal viscera cephalad to improve surgical access to the pelvic organs. The patient is positioned supine with the head of the operating table tilted down and is used, for example, in laparoscopic (Levy & Mobasheri, 2017:216) and bariatric surgery. The identical safety precautions are adhered to as in the supine position. The perioperative team members can follow the **TILT** mnemonic to assist with Trendelenburg positioning; ***T****rial* of position is important when the patient can still discuss what is comfortable and their range of movement is established; ***I****nitiate* auscultation, after intubation is important to ensure the endotracheal tube did not migrate to the right bronchus and the ventilation pressure is adjusted accordingly; ***L****oss of vision*, is associated with lengthy procedures, for example, spinal surgery. The ***T****ilt* function is minimized to enhance surgical access while maintaining ventilation (Woodfin *et al*., 2018:328). The Trendelenburg position causes redistribution of the blood supply from the lower extremities to the central and pulmonary circulation and can causes greater cardiovascular and pulmonary changes compared to the supine position. It can result in decreased limb perfusion and decreased venous return from the head, including increased venous return, increased central blood volume and mean arterial pressure. Furthermore, with the head down, intracranial and intraocular pressure increases and is not recommended for patients who are at risk. Moreover, reports have shown that visual loss has occurred after prolonged surgery in this position as well as a brachial plexus injury when shoulder supports are placed at the back of the neck (Welch, 2018:6).

The *reverse* Trendelenburg position promotes drainage of body fluids away from the surgical site, resulting in venous pooling in the lower body that can result in hypotension. The perioperative team should minimize the degree of downward slope in the Trendelenburg position to reduce the risk that the patient will slip out of place. A risk of passive regurgitation can occur as the stomach is above the level of the glottis. This is a risk that should be taken into account when assessing the patient for intubation and/or reintubation (Welch, 2018:7).

2.7.3 Lithotomy Position

The lithotomy position provides surgical exposure for vaginal, rectal, and urological procedures (Abdalmageed, Bedaiwy & Falcone, 2017:16). Lithotomy is a supine position with the legs separated, the hips and knees are flexed to a variable degree. Modifications of the lithotomy position include low, standard, high, hemi- and exaggerated lithotomy and often includes adjustment to the Trendelenburg position. A variety of stirrups and slings are used to support the legs in this position. The hemi-lithotomy position is often used for positioning on an orthopaedic trauma table for repair of hip fractures. The perioperative team members can follow the LEGGS mnemonic to assist with lithotomy positioning; ***L****eave* the head in neutral alignment; ***E****lbows* padded; ***G****ently* raise the legs at the *same* time; ***G****et* fingers away from the bed; ***S****upport* the common peroneal nerve (Woodfin *et al.,* 2018:330). Raising the patient's legs shifts the blood from the legs to the central circulation, increasing cardiac output and venous return. Increased pressure on the diaphragm can cause respiratory compromise. Abdominal pressure may increase in lithotomy to obstruct venous return to the heart, resulting in hypotension, particularly patients with a large abdominal mass such as pregnant women (Welch, 2018:8). In a prospective study by Ginsburg, Pape, Heilbronn, Levin and Cher (2018:96) to assess positioning-related pain in 20 awake volunteers in a dorsal lithotomy study for awake robotic surgery requiring lithotomy, it was reported that the volunteers preferred having the arms slightly flexed and pronated as opposed to being straight and supinated; their necks should be flexed as opposed to being flat. The findings were incorporated into the positioning strategy in the research setting, as it provided a strategy to avert pressure injuries of patients who are anaesthetized and unable to report discomfort.

Lower extremity nerve injury (Sukhu & Krupski, 2014:5) can result from this position such as injury to the peroneal nerve due to compression at the level of the fibular head. The saphenous nerve can be compressed by contact with the leg brace medially as it crosses the medial femoral epicondyle. This bony prominence should be padded. The sciatic nerve can be stretched at the level of the hip or knee or may be compressed distally in the popliteal fossa. Legs should be positioned simultaneously in leg

supports or stirrups by two team members to avoid torsion of the lumbar spine, and extension of the hip joint (Welch, 2018:9).

2.7.4 Lateral Position

Lateral positioning is where the patient is positioned with the operative side facing up, for example, during thoracic surgery, orthopaedic procedures involving the hip and for renal procedures. A patient in the lateral position is at risk for injury from pressure on vulnerable points on the dependent side, for example the ear, acromion process, olecranon, iliac crest, greater trochanter, lateral knee and malleolus. The use of anterior and posterior supports, for example, blankets, gel rolls and beanbags aim to prevent the patient from rolling to the supine or prone position during surgery. The legs are slightly flexed, with a pillow or foam positioned between them to prevent pressure injuries and the arms are supported on gel pads or pillows. The risk of falling is an important factor in this position and straps with padding secures the patient without impeding circulation (Rowen & Johnson, 2012:31). Perioperative team members can follow the SIDESS mnemonic to assist with lateral positioning; ***S****tabilize* and support the neck; ***I****nsert* an axillary roll; ***D****o* not abduct arms more than 90 degrees; ***E****ye* and ear free of compression; ***S****uperior* leg remains straight; ***S****upport* dependent leg in bent position and with a pillow between the legs to prevent pressure at knees (Woodfin *et al.*, 2018:329).

2.7.5 Prone Position

The prone position provides access to the dorsal aspects of the patient's body during posterior spinal procedures such as for a laminectomy, rectal and superficial procedures on the back, and surgery on the posterior extremities such as avulsion of varicose veins. This position can cause cardiovascular changes. Abdominal compression in the prone position can cause veno-caval compression by reducing venous return which results in hypotension, venous stasis and increased pressure in the epidural venous plexus. Since the face is below the level of the heart, venous congestion and oedema may occur particularly during long procedures. In addition, postoperative visual loss is a risk (Welch, 2018:7).

The upper extremities are at risk of peripheral nerve injuries in the prone position. Arms can be placed at the sides or extended along the head on arm boards. Arms should not be over extended to prevent brachial plexus injury. The brachial plexus may be stretched when the neck is rotated. The patient's range of motion at the shoulder joint should be tested, and the patient's ability to rotate the head, preoperatively to determine the safe degree of extension of arms. Perfusion of the arms should be monitored with visual inspection, palpation of pulses, a non-invasive blood pressure cuff and

continuous pulse oximeter. The ulnar nerve at the elbow should be free and padded. The pressure points, for example, the breasts, iliac crests, and genitalia should be positioned to avoid compression and padded as needed. When a urinary catheter is inserted, it should be free from traction on the urethra and attached to a stand or the operating table (Welch, 2018:13).

In the hospital where the study was conducted, the Wilson frame is a newly acquired apparatus that has recently been introduced to the team members in the study setting. The head of the patient can be supported on a gel head rest, or held in skull pins with the Mayfield apparatus. The torso is supported on the Wilson frame and on chest rolls or pillows. The shoulders and elbows are flexed with the hands positioned facing upwards or pronated and tucked in at the patient's sides. Hips and knees are flexed, with the lower legs supported by a pillow to prevent pressure on the toes. Jack-knife position may cause venous pooling that may result in hypotension. The abdominal pressure of obese patients may compress the inferior vena cava as well as the aorta (as in the supine and Trendelenburg positions) and may compress the diaphragm affecting ventilation (Rowen & Johnson, 2012:31). Perioperative team members can follow the FACES mnemonic to assist with prone positioning: ***F****ace* free of compression; ***A****ll* pressure points are padded; ***C****hest* rolls under axilla and breasts; ***E****ven* shoulder height to prevent dislocation; ***S****upport* the lower legs (Woodfin *et al.*, 2018:329). In the prone position, the at-risk pressure points in addition to the face include the breasts, lower costal margins, iliac crests, elbows, knees, ankles, toes and genitalia (Lumbley, Ali & Tchokouani, 2014:368; Welch, Brummett & Shanks, 2009:11; Carlson, 2012:5).

2.8 DOCUMENTATION OF POSITIONING

Documentation is important in all the phases of the patient's journey through the OR department from the pre-operative phase to handing over the patient to the ward staff (Muller, *et al*., 2018:1; Spruce, 2017:94).

2.8.1 Preoperative documentation

Documenting the preoperative assessment creates a baseline for future reference, for example, the condition of the skin before applying a diathermy pad. The policy on perioperative documentation in the research setting includes a preoperative checklist. The nurses present during a procedure are required to complete the assessment criteria as follows:

- Identification and titles of people participating in positioning the patient, identifying the responsibility and role of team members.
- Patient's position, including position of arms and legs and any repositioning done intra-operatively.

- Type and location of positioning equipment or devices used.
- Type and location of safety restraints.
- Type and location of any additional padding. For example, pillows under the knees in supine position.
- Documenting specific actions taken to prevent patient injury, such as gel pads that were used; the bed or trolley brakes were applied before the transfer of the patient to the operating table.
- Type and location of implants, jewellery, or other items that cannot be removed (Hospital, 2018:1-7).

2.8.2 Intraoperative documentation

During the operating procedure, any change in position is documented to ensure the patient's safety. For example, with a laparoscopic cholecystectomy the patient's position changes from supine to Trendelenburg and is rotated to the left side to facilitate surgical access. Any additional procedures that were performed, for example the insertion of a urinary catheter, is recorded (Phillips, 2007:512).

2.8.3 Post-operative documentation

The documentation of the patient's overall wellbeing and the position the patient was in during the operating procedure is communicated to the recovery room nurse by making use of the **ISBAR** acronym to prevent any miscommunication and misunderstanding. Included in this communication is the estimated blood loss and any adverse events that may have occurred during the surgery such as complications that may arise during positioning, including friction or burns due to the patient's skin touching metal (Lin, 2015:9). The documentation of skin integrity post operatively is important, where, for example, the patient was admitted to the OR with a bruise on the left thigh, to ensure that the lesion was not part of poor positioning in the OR. Incident reports are written when an adverse event occurs, with the purpose of implementing additional training if warranted (Hospital, 2018:1-7).

2.9 CONCEPTUAL FRAMEWORK

Patricia Benner's theory of nursing practice (Benner, 2001:13) and the Knowledge, Attitude and Practice Framework (KAP-O) (Rav-Marathe, Wan & Marathe, 2016:6) underpinned this study. Benner describes the five stages of nurse development, namely, novice, advanced beginner, competent, proficient and expert. Benner's theorizes that a nurse's years of experience contributes to their level of competence. This model was applied to the study setting, to identify whether the level of knowledge and years of nursing experience of the different categories of staff indicated a need for ongoing training in perioperative PI prevention strategies. For adequate integration into the work

setting, thorough orientation of newly qualified nurses or, as in this study setting, the orientation of newly appointed nurses to perioperative PI prevention and management is necessary (Lindfors & Junttila, 2014:5). In a systematic review of literature on the effect of nurses' competency, these authors found that a competent nurse has the ability to perform a task with a desirable outcome under various conditions in the real world, demonstrating optimal adequacy and the ability to integrate knowledge, skills, attitudes and values in specific contextual situations of practice (Lindfors & Junttila, 2014:4).

In addition, to the Benner model, two constructs from the KAP-0 model (Rav-Marathe, Wan & Marathe, 2016:4) were used in this study. KAP-O is a mnemonic, with "K" that stands for knowledge of the problem or disease; "A" for attitude towards the problem or disease, and "P" for practice or preventive behaviour to protect against the problem or disease. Knowledge is defined by Grove, Burns and Gray as the vital "content or body of information for a discipline that is attained through traditions, authority, borrowing trial and error, personal experience, role-modelling and mentorship, intuition, reasoning and research (Grove, S.K., Burns, N. & Gray, 2013:698)." Attitude is defined by Babin and Zigmund as a continuing penchant to dependably respond in a specified way to several characteristics of the world that includes "affective, cognitive and behavioural components (Babin & Zikmund, 2016:284)." The knowledge construct used in this study, measured the participants empirical and ethical approach to PI by evaluating their knowledge of pressure injuries, patient positioning, patient assessment and risk. The practice construct measured the participants individual skill in initiating action for a patient-centred staging/grading of pressure injuries, risk assessment, management interventions and self-directed reflection on learning needs. The conceptual framework used in this study follows in Figure 2.1.

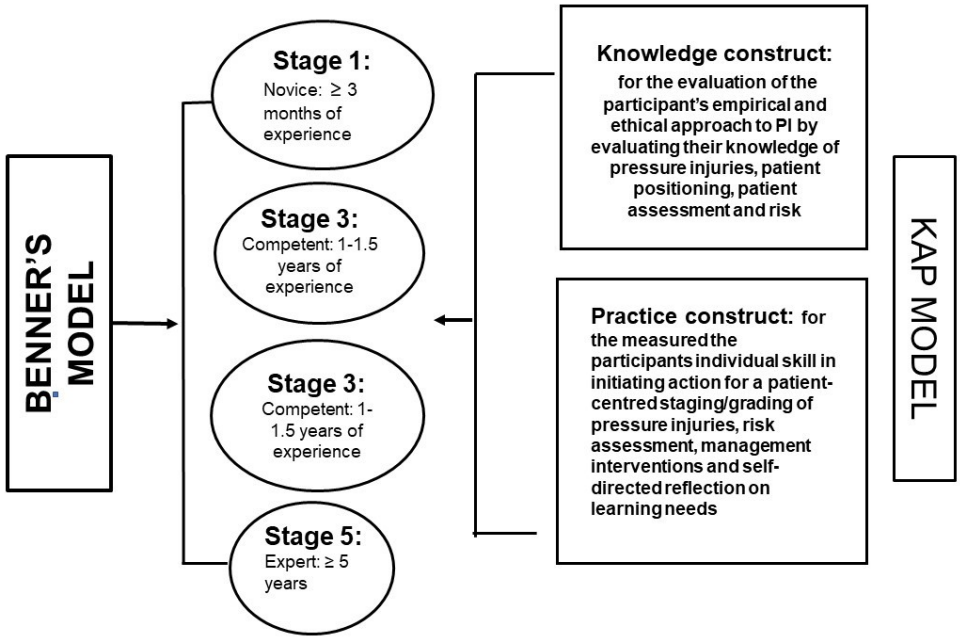

Figure 2.1: A conceptual diagram of the constructs that were measured in this study.

Adapted from Benner's Novice to Expert Nursing Theory (Benner, 2001:13) and the KAP-O Model (Rav-Marathe, Wan & Marathe, 2016:6)

2.10 SUMMARY

For this study, the literature review provided important published evidence-based criteria on which safe patient positioning protocols in the OR should be based. The patient's age, gender and existing comorbidities must be taken into consideration by the peri-operative team before the patient is anaesthetized. The review included published literature on the risks associated with the team members' lack of continuing professional development or in service training and the consequences for optimal patient safety.

2.11 CONCLUSION

This chapter presented the literature review retrieved from English peer-reviewed journal articles including the guidelines of the two authorities by which the study setting is accredited. Benner's model of nursing practice forms part of the conceptual framework and is important to this study since the different levels of nurses and the anaesthetic technician's knowledge and practice for PIs is influenced by their level of experience.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

In this chapter, the research methodology is applied to determine the knowledge and clinical practices of nurses on the prevention of pressure injuries, and to identify whether a relationship exists between educational opportunities provided and the participants knowledge of departmental guidelines.

3.2 AIM AND OBJECTIVES

Within the quantitative approach, a descriptive survey is used to provide information about a specific situation (Burns & Grove, 2007:240). This study aimed to determine the knowledge and clinical practices of nurses in the prevention of pressure injuries in perioperative patients in a Middle East operating department. According to Patricia Benner's Novice to Expert Nursing Theory, nurses develop their skills over time. Teaching and experience play an important role in nurses' skills development, allowing a nurse to fully understand high quality patient care. To be skilled in positioning of patients in the peri-operative settings, nurses embark on a journey to grow from novice to expert (Benner, 2001:13).

The KAP-O model of behavioural change is used in this study with Benner's Novice to Expert nursing theory. If the nurses receive education, their newly acquired knowledge and attitudes should change their practices, and patient outcomes will be improved (Rav-Marathe, Wan, & Marathe, 2014:6). According to Benner's theory, the nurses will become experts the longer they are exposed to learning opportunities in practice.

3.3 STUDY SETTING

The study was conducted in the OR department in a hospital in the Middle East where the researcher is employed as an OR nurse. The department consists of four operating theatres, one recovery room and one day surgery facility. The OR conducts elective and emergency surgery on adults, children and infants. The following disciplines of surgery are provided: endoscopy surgery in orthopaedics, gynaecology and ENT; orthopaedic fracture repairs; ophthalmology, major gastro-intestinal resections and cranio- spinal procedures. Many of the afore-mentioned procedures are at a heightened risk of PI since the procedures can take time.

3.4 RESEARCH DESIGN

A research design is defined as "the overall plan for addressing a research question, including strategies for enhancing the study's integrity (Polit & Beck, 2018:416)." Thus, to answer the research

question and meet the objectives, an exploratory, descriptive cross-sectional quantitative design using an online self-report survey was used. An exploratory descriptive study is defined by Polit and Beck (2018:743) as a method used to explore the characteristics of an existing phenomenon for the purpose of using the data to evaluate current conditions in which to plan for improvements. A cross-sectional research design measures data at one point in time Polit and Beck (2018:400). In this study, the survey gathered data on the participant's knowledge of pressure ulcers and their actions for pressure ulcer prevent and treatment. The rationale for using this design is the efficiency and objectivity in collecting and analysing the data. Since the survey tool chosen for this study was not developed by the researcher of this study, the information contributes to the objectivity of the study. The phenomena explored in this research study were the current knowledge and clinical practices of nurses and anaesthetic technician's for preventing pressure injuries, (section 1,2 and 3 of the survey) and the relationship that exists between educational opportunities and their knowledge of departmental guidelines (section 4 and 5)

3.5 POPULATION AND SAMPLING

A population is the group of different individuals or units that the researcher wants to study to find answers for the research question (Burns & Grove, 2011:290). Three categories of nurse work in the four ORs, the recovery room and the day surgery unit in a Middle East Hospital (Saudi Commission for health specialities). They are categorised as follows:

- PN1 are nurses qualified with a degree or diploma from their country of origin in operating room nursing and that are allocated to work in OR.
- PN 2 nurses are qualified with degree or diploma working in general wards, department and have limited experience in specialised units.
- PN 3 nurses are general nurses with minimum training of two years, however they can have a number of years of nursing experience.

An anaesthetic technician is any non-physician healthcare professional who has undergone dedicated anaesthesia training which results in a formal qualification allowing them to provide anaesthesia. (Edgcombe *et al.*, 2019:2).

3.5.1 Sampling

A sample represents a selected percentage of the individuals or units within a population. A sample must be representative in terms of characteristics such as age, gender, ethnicity, income and education, which may influence the study variables (Burns & Grove, 2011:294).

3.5.2 Total population and sample

Polit and Beck (2018:416) defines census as a "survey that covers the whole population." Since the sample in this study was small the full census of staff was used. In this research setting the team comprised of registered nurses categorized on three levels according to their level of education (Staff Nurses, PN 1, PN 2, PN 3) and included the anaesthetist technicians. For this study, the total population working in the four ORs, the recovery room and in the day surgery unit in a Middle East Hospital were: N=45 registered nurses across the three levels and N=10 anaesthetist technicians. The rationale for using one hospital in the group is the state policy on confidentiality and secrecy that inhibits research being conducted in all the hospitals in the organisation.

3.5.3 Inclusion criteria

The inclusion criteria are individuals or units who have specific characteristics to be included as the target population (Polit, D.F. & Beck, 2018:405). The inclusion criteria for this study were all the registered nurses and anaesthetist technicians working in four ORs, one recovery room and in a day surgery unit.

3.5.4 Exclusion criteria

Participants who were absent were excluded over the two-week data collection period.

3.6 INSTRUMENTATION

The original self-administered paper and pen questionnaire was converted into a computerised survey on CheckBox© software that is managed by Stellenbosch University.

The computerised survey questionnaire consisted of questions, on Likert scales ranging from highly likely, likely, neither likely nor unlikely, unlikely, highly unlikely and N/A in my role.

1. Section 1: Demographic data included 4 items about employment history, clinical and perioperative responsibilities and nursing academic qualifications.
2. Section 2: Education received on PI (10 items)
3. Section 3: Patient assessment and risk factors (7 items)
4. Section 3.1: Stages and grading of PI (4 items)
5. Section 4: Policies and guidelines (4 items)
6. Section 5: Risk management and communication of treatment (6 items)
7. Section 6: Interventions.

The single open-ended question was removed for the purpose of this study since it was a concern that the survey was long, and participant attrition needed to be avoided.

3.7 PILOT STUDY

A pilot study was conducted with three experts on wound management, surgical positioning in the OR and one multilingual ward nurse to determine if any adjustments were necessary in terms of the clarity of the completion instructions and the time required to complete the survey in the context in which the study took place. Following the feedback, changes were made regarding the survey numbering. The pilot study data was excluded from the main study.

3.8 VALIDITY AND RELIABILITY

3.8.1 Reliability

Reliability is defined as the ability of an instrument to consistently give the same results when used in similar circumstances (Polit & Beck, 2018:406). Content reliability and construction of the questionnaire was tested during the pilot study, and during the original before-after intervention study (Sutherland-Fraser, McInnes, Maher & Middleton, 2012:25) (Annexure A: Instrument)

3.8.2 Validity

Validity of an instrument refers to the extent to which the instrument measures what it was supposed to measure and was assessed by its face and content validity (Polit & Beck, 2018:403).

3.8.2.1 Face Validity

Face validity is considered acceptable if an instrument on the face of it measures the phenomena the researcher wants to study (Polit & Beck, 2018:403). The instrument was developed from the USA's National Pressure Ulcer Advisory Panel (NPUAP) classification system and the Australian Wound Management Association's (AWMA) Clinical Practice guidelines for the Prediction and Prevention of Pressure Ulcers and a systematic review. In this study, during pilot testing, three experts on wound management, surgical positioning in the OR and one multilingual ward nurse were used to determine if any adjustments were necessary in terms of the clarity of the completion instructions and the time required to complete the survey in the context in which the study took place. No changes were recommended.

3.8.2.2 Content Validity

Content validity is the degree to which a multi-item survey measures a set of items that reflect the full content of the construct domain (Polit & Beck, 2018:399). Content validity of the PU data collection form was originally evaluated by four clinicians knowledgeable in PU research. Three reviewers resided in Australia and one in the United Kingdom. These three reviewers consisted of a geriatrician, a coordinator of nursing research, a clinical lecturer at a tertiary education facility and a wound care

consultant (Prentice, Stacey & Lewin, 2003:93). They were asked to critique the data collection form for ease of reading and comprehension of questions to determine if the form was 'user friendly'. No amendments were suggested following this review. The data collection form was also subjected to a pilot study at Fremantle Hospital, after which minor amendments to the order of the questions were made (Prentice, Stacy & Lewin, 2003:93) No other computed tests were performed to validate the content.

3.9 DATA COLLECTION

The system of data collection consisted of the pilot study and the main study conducted over two weeks from 27 January 2021 to 15 February 2021 and extended for a week following email reminders to participate. Data was collected at the participants place of employment. Following the institution's authority to conduct the study, the Human Resource Manager was requested to obtain the potential participants email addresses, which were then uploaded to SunSurvey. Following completion of the consent portion, the survey opened. Once completed, it was stored by SunSurvey, a cloud-based computer data service managed by Stellenbosch University that excluded any participant identifiers, namely their email addresses. CheckBox asserts that customers are also expected to maintain sufficient security and protection of their own servers and systems, and to protect sensitive and confidential survey and user data in their possession.

3.10 DATA ANALYSIS

Data analysis was performed to condense, arrange and give meaning to it (Polit & Beck, 2018:229). Data analysis was computed with the assistance of a qualified biostatistician from the Centre for Statistical Consultation at Stellenbosch University, Prof Tonya Esterhuizen regarding the planning and implementation of data analysis for this study.

3.10.1 Steps of analysis

The data was entered into an Excel spreadsheet with one variable per column. The questions or variables were colour coded into groups that were identified as demographic data, the variables related to knowledge, clinical practices, and questions related to educational opportunities and their knowledge of departmental guidelines. Following this the spreadsheet was uploaded to the SPSS 27 software. Analysis was performed to meet the research objectives. Descriptive and frequency statistics were calculated and are presented in tables.

In section 1: Demographic Data, the researcher confirmed that each respondent complied with the inclusion criteria for the study.

In sections 2-5, the responses were analysed for their mean scores. The mean is the central tendency where the total scores are divided by the number of scores being summed (Polit & Beck, 2018:408). Their registered nurses and anaesthesia technician's level of experience and knowledge of the prevention and management of PUs were compared.

3.11 SUMMARY

In this study an online self-administered exploratory and descriptive survey was conducted. All the registered professional nurses and anaesthetic technicians that were employed in the OR department of a Middle Eastern hospital were approached to participate. Reliability, validity and ethical considerations were ensured, and the analysis was performed descriptively since the sample was small.

3.12 CONCLUSION

Chapter 3, includes an explanation of the research method adopted for this study, the target population, and sample. The researcher acquired permission from the original authors of the instrument to apply it in the study setting. Originally, the survey was not assessed for validity and reliability using statistical software. However, it was piloted prior to the full study with experts in the field and it was found to be valid and reliable for the constructs that were measured. The data collection strategy and the analysis on SPSS 27 were detailed in this chapter. All ethical considerations pertaining to the institution and the participants was elaborated upon. In Chapter 4 the data analysis strategy and interpretation of the findings is explained.

CHAPTER 4: RESULTS

4.1 INTRODUCTION

In this chapter, the analysis of the data collected during the research study is presented. The results will be discussed in detail in chapter 5.

4.2 DATA ANALYSIS

Data analysis is the systematic organization and synthesis of the research data to answer the research questions (Polit & Beck, 2018:401). Interpretation of the findings are presented in tables.

4.2.1 Data preparation

On opening the survey responses in the CheckBox software output program, the researcher assigned a number to each survey. As described earlier, an Excel spreadsheet was populated with the survey's variables, following which the data was categorized according to the constructs that were measured. The Excel spreadsheet was then loaded onto SPSS 27 software program. Prof T. Esterhuizen guided the researcher on the method of analysing the data and computing descriptive statistics. Each result was formulated into a table and exported to Microsoft Word for inclusion in this thesis.

4.2.2 Descriptive statistics

The sample in this study was small (n=24) therefore only descriptive analysis was performed. On the recommendation of the statistician the Fisher Freeman Holten exact test was conducted to determine whether a relationship or trend emerged from the data. This test is used as a substitute for the Chi-squared tests where the *p*-values are based on large samples (Polit & Beck, 2018:421). An exact calculation of the *p*-value is computed to examine whether associations are present in the data.

4.3 QUESTIONNAIRE RESPONSE RATE

The questionnaire response rate was calculated by dividing the number of returned questionnaires by the study population statistic (Polit & Beck, 2018:743) and in this study the population consisted of nurses and anaesthesia technicians. The number of returned questionnaires (n=24) was divided by the number of the study population (N=36) to reveal a response rate of 66%. None of the returned surveys were incomplete. According to Polit and Beck (2018:220) self-administered questionnaires especially those delivered over the Internet are an economical approach to doing a survey, however tend to yield low response rates. However, the response rate in this study is considered acceptable for an online survey questionnaire.

4.4 DEMOGRAPHIC PROFILES OF PARTICIPANTS

Descriptive statistics were used to analyse the demographic data: the respondent's main area of practice; the respondent's designation; the respondent's nursing qualification; the respondent's employment status and the respondent's usual work shifts.

Table 4.1 shows the total number of participants according to their employment category. The majority (50.0%, n=12) were specialist trained scrub nurses, whereas 20.8% (n=5) were not specialist trained recovery room nurses, followed by 16.7 % (n=4) who were specialist trained educators and/or managers and 12.5 % a (n=3) were anaesthetic technicians. They were all employed fulltime.

Table 4.1: Total number of participants according to employment category.

Variable	Categories	Frequency	Percentages
		n	%
Main area of practice	Anaesthetic technicians	3	12.5
	Scrub nurses	12	50.0
	Recovery room nurses	5	20.8
	Education / Management	4	16.7
		N=24	**100%**

Most of the participants were specialist-trained staff nurses, managers or educators (46%, n=11), while (33.3%, n=8) were registered nurses (not specialist-trained), 12.5% (n=3) were anaesthetic technicians and 8.3% (n=2) were level 3 registered nurses with a 2-year educational training. Table 4.2. follows.

Table 4.2: Designation of participants.

Variable	Categories	Frequency	Percentages
		n	**%**
Designation	Staff Nurse/managers, educators	11	46
	Registered nurses (not specialist-trained)	8	33.3
	Registered nurses (2-year educational training)	2	8.3
	Anaesthetic Technician	3	12.5
		n=24	**100%**

As shown in Table 4.3 most of the participants were OR specialist trained nurses (37.5%, n= 9) and had worked in the OR as a nurse for 10-15 years, as had the anaesthetic technicians, followed by 29.2% (n=7) of the nurses who had more than 20 years of experience. Almost 17% (n= 4) had 10-20 years of experience, while 12.5% (n= 3) had between 5 and 10 years of experience, and 4.2% (n=1) had worked for 3-5 years in an OR. All nurses are qualified as general nurses with either a bachelor's degree or a diploma in nursing.

Table 4.3: Years of experience since qualifying as a nurse or anaesthetic technician.

Variable	Categories	Frequency	Percentages
		n	%
Years of experience	Above 20 years	7	29.2
	15-20 years	4	16.7
	10-15 years	9	37.5
	5-10 years	3	12.5
	3-5 years	1	4.2
		n=24	100%

Most of the participants (83.3%: n=20) in the OR worked from 07h00 to 16h00, with two nurses (8.3%: n=2) that worked from 07h00 to 19h00 and another two who worked (8.3%: n=2) from 19h00-07h00.

4.5 SECTION 2: EDUCATION AND TRAINING ON PRESSURE ULCER PREVENTION AND POSITIONING

This section consisted of 10 questions on the respondent's education and training on PU prevention and management. Table 4.4 – table 4.11 reflect the education of participants.

4.5.1 Question 6: Have you received any formal education on pressure ulcers within the last 2 years?

Table 4.4 shows that 50.0% (n=12) *received formal education on pressure injuries within the last 2 years* and 50.0% (n=12) *did not receive formal training on pressure injuries.* Formal training in the study setting refers to in-service or continuing professional development training opportunities provided by the employer.

Table 4.4: Formal education received during the last 2 years

Variables	Categories	Frequency	Percentages
		n	%
Have you received any formal education on pressure ulcers within the last 2 years?	YES	12	50.0
	NO	12	50.0
		n=24	**99.9%**

4.5.2 Question 7: If yes, please identify the type of education.

Table 4.5 below shows the type of education the participants received. Almost fifty percent (45.8%: n=11) responded *none of the above*, twenty-five percent (25.0%: n=6) received training through a *seminar/workshop*, 16.7% (n=4) through *clinical instruction* and 4.2% (n=1) received education through *orientation, in-service,* and *formal study*. Either the participants were not up to date with their competencies as stipulated in their employment contracts or CPD opportunities were not provided in the study setting.

Table 4.5: Please identify the type of education.

Variables	Categories	Frequency	Percentages
		n	%
If yes, please identify the type of education	Orientation	1	4.2
	Clinical Instruction	4	16.7
	In-service	1	4.2
	Seminar / Workshop	6	25.0
	Formal Study	1	4.2
	None of the above	11	45.8
		n=24	**99.9%**

4.5.3 Question 8: Please identify the approximate duration of the education in total.

Table 4.6 indicates the duration of time spent on education. Almost forty-six percent (45.8%: n=11) *spent 30 minutes* on education, 25.0% (n=6) spent *1 hour,* 16.7% (n=4) attended one *day* on training/education and 12.5% (n=3) *spend 1-4 hours* on education.

Table 4.6: The approximate duration of the education attended.

Variables	Categories	Frequency	Percentages
		n	%
Please identify the approximate duration of the education you attended in total	30 minutes	11	45.8
	1 hour	6	25.0
	1-4 hours	3	12.5
	1 day	4	16.7
		n=24	**99.9%**

4.5.4 Question 9: Please identify the content of the education.

Table 4.7 identified the content of education provided. Almost thirty-eight percent of the participants (37.5%: n=9) chose *none of the above*, 33.3% (n=8) received education on *pressure ulcer aetiology*. Training on *risk factors* and *risk assessment tools* were studied by the least of the participants: 16.7% (n=4) and 12.5% (n=3) respectively. No participants selected the content of the education, namely, *prevention measures* or education on the *protocols and policies* in the study setting as the content of the education provided.

Table 4.7: The content of the education provided.

Variables	Categories	Frequency	Percentages
		n	%
Please identify the content of the education provided to you	Pressure ulcer risk aetiology	8	33.3
	Risk factors	4	16.7
	Risk assessment tools	3	12.5
	Prevention measures	0	0
	Protocols and policies	0	0
	None of the above	9	37.5
		n=24	**99.9%**

4.5.5 Question 10: When did you last read something specifically related to the risks and management of pressure ulcers for perioperative patients?

In table 4.8 0, the participants were asked to select when last they read something specifically related to *risk management of pressure ulcers for perioperative patients*: 45.8% (n=11) responded *never*, 33.3% (n=8) responded *more than a year ago,* 16.7% (n=4) read something *between 4-12 months ago* and 4.2% (n=1) selected *cannot remember*. No participants indicated that they had read literature on this aspect less than three months ago.

Table 4.8: Literature read specifically related to the risk and management of pressure ulcers for preoperative patients

Variables	Categories	Frequency	Percentages
		n	**%**
When did you last read something specifically related to the risk and management of pressure ulcers for preoperative patients?	Between 4-12 months ago	4	16.7
	More than a year ago	8	33.3
	I cannot recall	1	4.2
	Never	11	45.8
	< 3 months ago,	0	0
		n=24	**99.9%**

4.5.6 Question 11: What did you last read that specifically related to the risks and management of pressure ulcers for perioperative patients?

In table 4.9 below, where six options were provided, half the participants indicated that they had *read a hospital policy* (50.0%: n=12), followed by 16.7% (n=4) who read an *internal department policy,* 12.5% (n=3) *read a journal or textbook,* about twelve percent *indicated none of the above* (12.5%: n=3) and 4.2% (n=1) *read the National pressure ulcer advisory panel position statements or AORN: perioperative standards and Recommended practices.* No participants selected the Area Health Service Policy, NSW Heath Policy, Wound Care Association of New South Wales Guidelines, Australian Wound Management Association Guidelines, European Pressure Ulcer Advisory Panel Guidelines, Joanna Briggs Best Practice Sheets, Association of Canadian Operating Room Nurses or product literature.

Table 4.9: Literature read specifically related to the risks and management of pressure ulcers for perioperative patients

Variables	Categories	Frequency n	Percentages %
What did you last read that specifically related to the risks and management of pressure ulcers for perioperative patients?	Internal Department Policy	4	16.7
	Hospital Policy	12	50.0
	NPUAP: National Pressure Ulcer Advisory Panel Position Statements	1	4.2
	AORN: Perioperative Standards and Recommended Practices	1	4.2
	Journal or Textbook	3	12.5
	None of the above	3	12.5
		n=24	**99.9%**

4.5.7 Question 12: Have you received any formal education on patient positioning within the last 2 years? and (question 13) if "yes", please identify the type of education

Table 4.10 indicates the form of education and the frequencies for those participants who indicated that they had received formal indication on patient positioning within the last 2 years. Fifty percent attended *clinical instruction* on patient positioning (50%: n=12), almost seventeen percent (n=4) received training during *orientation*, one participant each (4.2%: n=1) *attended in service training or a seminar/workshop*. Three *formally studied the topic* (12.5%: n=3) and a further three indicated *none of the above*. Formal education that the participants attended in the past 2 years, may have been in their previous place of employment.

Table 4.10: Formal education received on patient positioning within the last 2 years

Variables	Categories	Frequency n	Percentages %
Have you received any formal education on patient positioning within the last 2 years?	Orientation	4	16.7
	Clinical instruction	12	50.0
	Inservice	1	4.2
	Seminar/workshop	1	4.2
	Formal study	3	12.5
	None of the above	3	12.5
		n=24	**100%**

4.5.8 Question 14: Please identify the approximate duration of the education in total

Table 4.11 indicates the *duration of the education* in total: half the participants (50.0%: n=12) spent *half an hour on education*, 20.8% (n=5) spent *one hour and 1-4hours* respectively, while two participants spent *one day on education* (8.3%: n=2).

Table 4.11: The approximate duration of the education.

Variables	Categories	Frequency n	Percentages %
Please identify the approximate duration of the education in total	1/2 an hour	12	50.0
	1 hour	5	20.8
	1-4 hours	5	20.8
	1 day	2	8.3
		n=24	**99.9%**

4.5.9 Question 15: Please identify the content of the education

The content of the education is illustrated in table 4.12. Half the participant's educational content consisted of *protocols and policies* (50.0%: n=12), almost twenty-one percent studied *positioning risks* (20.8%: n=5), 12.5% (n=3) on *anatomy and physiology* and 8.3% (n=2) on *positioning equipment* and *surgical positions.*

Table 4.12: The content of the education provided.

Variables	Categories	Frequency n	Percentages %
Please identify the content of the education	Anatomy and Physiology	3	12.5
	Positioning Risks	5	20.8
	Positioning Equipment	2	8.3
	Surgical Positions	2	8.3
	Protocols and Policies	12	50.0
		n=24	**99.9%**

4.5.10 Question 16: When did you last read something specifically related to positioning of perioperative patients?

In table 4.13 the participants were asked to identify when last they read something specifically related to *positioning of perioperative patients*: 41.7% (n=10) responded *never,* 25.0% (n=6) responded *less than 3 months ago*, 12.5% (n=3) *4-12 months ago* and *more than a year ago respectively* and 8.3% (n=2) indicated that they *cannot remember.*

Table 4.13: When literature was last read specifically related to the positioning of perioperative patients.

Variables	Categories	Frequency n	Percentages %
When did you last read something specifically related to positioning of perioperative patients?	Less than 3 months ago	6	25.0
	4-12 months ago,	3	12.5
	More than a year ago	3	12.5
	I cannot remember	2	8.3
	Never	10	41.7
		n=24	**99.9%**

4.5.11 Question 17: What did you last read something that specifically related to positioning of perioperative patients?

In table 4.14, almost half of the participants (45.8%: n=11) had *read none* of the listed sources, followed by 37.5% (n=9) who had read *AORN: perioperative standards and recommended practices*, 8.3% (n=2) read a *journal or textbook* and 4.2% (n=1) had read s*ystematic reviews (Cochrane Reviews) and ACORN: Perioperative standards* respectively.

Table 4.14: Literature read specifically related to positioning of perioperative patients.

Variables	Categories	Frequency n	Percentages %
What did you last read something that related to positioning of perioperative patients?	Systematic Reviews (Cochrane Reviews)	1	4.2
	ACORN: Perioperative Standards	1	4.2
	AORN: Perioperative Standards and Recommended Practices	9	37.5
	Journal or Textbook	2	8.3
	None of the above	11	45.8
		n=24	**99.9%**

Table 4.15 below presents the Chi-Square test to identify whether a relationship exists between education opportunities and the participants knowledge of departmental guidelines among the participants in the study setting. The Chi-Square statistic appears in the Value column of Chi-Square Test table and the *p*- value appears in the table in the "Asymptotic Significance (2-sided)" column. The result is significant if this value is equal to or less than the designated alpha level (normally .05). Pearson Chi-Square statistic for *Education Opportunities* and the participants *Knowledge of Departmental Guidelines* in the OR is 157.600 and the *p*- value is (.449). In this case, the *p*- value is lower than the standard alpha value (.05), indicating there is statistically significant evidence associated between Educational Opportunities and the participants Knowledge of Departmental Guidelines in the study setting.

Table 4.15: Chi- Square was run to identify whether a relationship existed between education opportunities, and the participants knowledge of Departmental Guidelines (N=24).

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	157.600a	156	.449
Likelihood Ratio	86.179	156	1.000
Linear-by-Linear Association	.647	1	.421
N of Valid Cases	24		

182 cells (100.0%) have expected count less than 5. The minimum expected count is .04.

4.6 SECTION 3: PRESSURE ULCER STAGES AND GRADING

4.6.1 Question 18: Are you familiar with the staging/grading of pressure ulcer development as described in the literature?

The majority of the participants (54.2%: n=13) answered *yes, I'm somewhat familiar with the stages of pressure ulcer development as described in literature,* whereas 29.2% (n=7) answered *no, I cannot describe the stages* and 16.7% (n=4) responded *I can describe the stages of pressure ulcer development from 1-4.*

Table 4.16: Familiarity with the staging/grading of pressure ulcer development as described in the literature

Variables	Categories	Frequency n	Percentages %
Are you familiar with the staging / grading of pressure ulcer development as described in the literature?	Yes, I can describe the stages / grades of pressure ulcer development, from 1 to 4	4	16.7
	Yes, I'm somewhat familiar with the stages	13	54.2
	No, I cannot describe the stages	7	29.2
		n=24	**99.9%**

4.6.2 Question 19: Please place a number in each box to indicate the Pressure Ulcer Stages from 1 to 4 that you believe match each of the descriptions.

The participants were required to correctly allocate a number from 1-4 to each description of the PU stages. In the list of categories, the first category described a stage 4 pressure ulcer, 95.8% (n=23) responded correctly that the description was a *stage 4* and 4.2% (n=1) responded incorrectly that the description was a *stage 1* pressure ulcer.

The second category described a stage 2 PU and 75% (n=18) of the participants correctly identified it, while 16.7% (n=4) incorrectly identified it as a stage 3 PU and n=2 (8.3%) incorrectly identified it as a stage 1 PU.

The third category described a stage 1 PU and 66.7% (n=16) correctly identified it. However, 20.8% (n=5) incorrectly labelled it as a stage 2 PU; 8.3% (n=2) incorrectly identified it as stage 3 and n=1 (4.2%) incorrectly indicated it was a stage 4.

Seventy-five percent (n=18) of the participants correctly identified the fourth category as a stage 3 PU. However, 16.7% (n=4) incorrectly identified it as stage 1 and n=2 (8.3%) also incorrectly identified it as stage 4. Table 4.17 on the following page presents the correctly identified results.

Table 4.177: Please place a number in each box to indicate the Pressure Ulcer Stages from 1 to 4 that you believe match each of the descriptions below.

Variables	Categories		Frequency n	Percentages %
Please identify the Pressure Ulcer stages from 1-4 that you believe match each of the descriptions.	4	Full thickness skin loss with extensive destruction, and tissue necrosis extending to underlying bone, tendon or joint capsule	23	95.8
	2	Partial-thickness skin loss or damage involving epidermis and/or dermis	18	75.0
	1	Discolouration of intact skin, including non-blanchable erythema, blue/purple and black discolouration	16	66.7
	3	Full thickness skin loss involving damage or necrosis of subcutaneous tissues; but not through underlying fascia and not extending to underlying structures	18	75
			n=24	**99.9%**

4.6.3 Question 20: During the patient's journey through the operating suite, you are the first person to identify that the patient has developed a Stage 1 pressure ulcer on the heels. Please list the actions you will take to manage this change in the patient's status.

Table 4.17 on the following page shows that almost 46 percent (45.8%: n=11) selected they would *reposition the patient*. However, only two participants selected the option to either *reposition the limb onto a doughnut or air pillow* (8.3%: n=2) or *notify the nurse at handover* (8.3%: n=2), or *document in the notes / charts* (8.3%: n=2). Five participants indicated they would *rub/massage the area* (4.2%: n=1), or *place an occlusion dressing on the area* (4.2%: n=1) or *mark the area of tissue damage* (4.2%: n=1) or *place a hydrocolloid dressing on the area* (4.2%: n=1) or complete an incident report (4.2%: n=1).

Table 4.18: List the actions taken to manage a Stage 1 pressure ulcer on the heals.

Variables	Categories	Frequency n	Percentages %
During the patient's journey through the operating suite, you are the first person to identify that the patient has developed a stage 1 pressure ulcer on the heels. list the action you will take to manage the patient's status	Rub/massage the area	1	4.2
	Reposition the patient	11	45.8
	Place an occlusion dressing on the area (Opsite)	1	4.2
	Mark the area of tissue damage	1	4.2
	Reposition on to a doughnut or air pillow	2	8.3
	Place a hydrocolloid dressing on the area (Comfeel)	1	4.2
	Notify the nurse at handover	2	8.3
	Document in the notes / charts	2	8.3
	Complete an incident report	1	4.2
	None of the above	2	8.3
		n=24	**99.9%**

4.6.4 Question 21: During the patient's journey through the operating suite, you are the first person to identify that the patient has developed a Stage 2 pressure ulcer on their buttocks. Please list the actions you will take to manage this change in the patient's status.

Table 4.18 on the following page, shows the results for this variable. Less than half of the participants chose *reposition the patient* (45%: n=11) and only one participant indicated their choice for each of the following options: *Rub or Massage the area* (4.2%: n=1), *place an occlusion dressing on the area* (Opsite) (4.2%: n=1), *mark the area of tissue damage* (4.2%: n=1), *place a hydrocolloid dressing on the area* (Comfeel) (4.2%: n=1) *and complete an incident report* (4.2%: n=1). Two participants indicated that they would *reposition onto a doughnut or air pillow* and that they would *notify the nurse at handover* (8.3%: n=2). Two selected *none of the above* (8.3%: n=2).

Table 4.19: List the actions taken to manage a Stage 2 pressure ulcer on the buttocks.

Variables	Categories	Frequency n	Percentages %
During the patient's journey through the operating suite, you are the first person to identify that the patient has developed a stage 2 pressure ulcer on the buttock. list the action you will take to manage patient status	Rub/massage the area	1	4.2
	Reposition the patient	11	45.8
	Place an occlusion dressing on the area (Opsite)	1	4.2
	Mark the area of tissue damage	1	4.2
	Reposition on to a doughnut or air pillow	2	8.3
	Place a hydrocolloid dressing on the area (Comfeel)	1	4.2
	Notify the nurse at handover	2	8.3
	Document in the notes / charts	2	8.3
	Complete an incident report	1	4.2
	None of the above	2	8.3
		n=24	**99.9%**

4.7 SECTION 4: POLICIES AND GUIDELINES

4.7.1 Question 22: Are specific policies or guidelines for pressure ulcer prevention and management available in your hospital?

Most of the participants indicated that *yes* guidelines are available in the study setting (95%: n=23). One participant answered *no* (4.2%: n=1).

4.7.2 Question 23: If yes, are these policies or guidelines easily accessible to you?

All participants indicated that the policies or guidelines were easily accessible to them (100%: n=24).

4.7.3 Question 24: How often do you refer to these policies or guidelines?

Only three participants indicated that either they *always* referred to the policies or guidelines (12.5%: n=3) and three indicated that they *never* do (12.5%: n=3). The majority of the participants (54.2%: n=13) responded *some of the time*, 20.8% (n=5) responded to *most of the time.*

Table 4.209: Frequency in which to pressure ulcer prevention and management policies and guidelines are consulted.

Variables	Categories	Frequency n	Percentages %
How often do you refer to these policies or guidelines?	Always	3	12.5
	Never	3	12.5
	Some of the time	13	54.2
	Most of the time	5	20.8
		n=24	**99.9%**

4.7.4 Question 25: Are specific policies or guidelines for surgical patient positioning available in your hospital?

The majority of the participants indicated that specific policies or guidelines were available in the hospital (95.8%: n=23) and one participant selected that they were not available (4.2%: n=1).

4.7.5 Question 26: If yes, are these policies or guidelines easily accessible to you?

All twenty-four (100%: n=24) participants indicated that the policies were easily accessible to them.

4.7.6 Question 27: How often do you refer to these policies or guidelines?

The majority of the participants selected *some of the time* (54.2%: n=13), almost twenty-one percent (n=5) indicated *most of the time*, while three participants (12.5%: n=3) indicated *always and never respectively*.

Table 4.21: Frequency in which policies or guidelines on surgical patient positioning are consulted.

Variables	Categories	Frequency n	Percentages %
How often do you refer to these policies or guidelines?	Always	3	12.5
	Most of the times	5	20.8
	Some of the time	13	54.2
	Never	3	12.5
		n=24	**99.9%**

4.8 SECTION 5: ASSESSMENT OF RISK, MANAGEMENT AND COMMUNICATION OF ASSESSMENT/TREATMENT AND INTERVENTIONS

This section included questions related to safety practices, risk assessment and actions to prevent PIs perioperatively.

4.8.1 Question 28: Do you assess patients in your care for pressure ulcer risk?

Most of the participants 54.2% (n=13) answered *always*, followed by 33.3% (n=8) who answered *some of the time* and 12.5% (n=3) answered most of the time.

Table 4.22: Assessment of the patient for pressure ulcer risk.

Variables	Categories	Frequency n	Percentages %
Do you assess the patient in your care for pressure ulcer risk?	Always	13	54.2
	Most of the time	3	12.5
	Some of the time	8	33.3
		n=24	**99.9%**

4.8.2 Question 29: If not, why not?

It is evident from table 4.21 below that the majority of the participants (83.3%, n=20) answered *none of the above,* (8.3%, n=2) answered *not enough time* and (4.2%, n=1) answered *not familiar with the paper work* and *lack of confidence*.

Table 4.23: Reason for not assessing the patients pressure ulcer risk.

Variables	Categories	Frequency n	Percentages %
If not, why not?	Not enough time	2	8.3
	Lack of confidence	1	4.2
	Not familiar with the paper work	1	4.2
	None of the above	20	83.3
		n=24	**99.9%**

4.8.3 Question 30: How often do you assess patients in your care for pressure ulcer risk?

Fifty-four percent of the participants selected the option that they *always* assess the patients (54%: n=13), followed by thirty-three percent who indicated *some of the time* (33.3%: n=8) and *most of the time* was selected by three participants (12.5%: n=3).

Table 4.24: Frequency in which a patient in the participant's care is assessed for pressure ulcer risk.

Variables	Categories	Frequency n	Percentages %
How do you assess patients in your care for pressure ulcer risk?	Always	13	54.2
	Most of the time	3	12.5
	Some of the time	8	33.3
		n=24	**99.9%**

4.8.4 Question 31: Where is the pressure injury risk assessment score documented in the patient's notes?

Most of the participants 37.5% (n=9) answered in [the] *patient's progress notes*; 29.2% (n=7) answered *unsure*, followed by 25.0% (n=6) who selected in *clinical pathway* and 8.3% (n=2) answered *none of the above*.

Table 4.25: Location of the pressure injury risk assessment score that is documented in the patient's notes.

Variables	Categories	Frequency n	Percentages %
Where is the pressure ulcer risk assessment score documented in the patient's notes?	Patient's progress notes	9	37.5
	Clinical pathway	6	25.0
	Unsure where	7	29.2
	None of the above	2	8.3
		n=24	**99.9%**

4.8.5 Question 32: How often do you use the pressure injury risk assessment tool?

Thirteen participants indicated they were *highly likely* to use the assessment tool (54.2%: n=13), followed by almost seventeen percent indicating the use of the tool is *not applicable to their role* in the OR (16.7%: n=4). Twelve percent selected *unlikely* (12.5%: n=3). Two participants indicated *neither likely nor unlikely* (8.3%: n=2) and two participants indicated *likely and highly unlikely* (4.2%: 1).

Table 4.26: Frequency in which the pressure injury risk assessment tool is used.

Variables	Categories	Frequency n	Percentages %
How often do you use the pressure injury risk assessment tool?	Highly likely	13	54.2
	Likely	1	4.2
	Neither likely nor unlikely	2	8.3
	Unlikely	3	12.5
	Highly unlikely	1	4.2
	N/A in my role	4	16.7
		n=24	**99.9%**

4.8.6 Question 33: How likely are you to complete the pressure injury risk assessment score in the following situations?

In the table below the most frequent responses to the options are provided. Fifty percent of the participants indicated they were *highly likely* to complete the score except for the option *whenever the patient is repositioned* where only thirty-seven percent selected highly likely (37.5%: n=9).

Table 4.27: Completion of the pressure injury risk assessment score in certain situations

Variables	Categories		Frequency n	Percentages %
How likely are you to complete the risk assessment score in the following situations?	On admission to the OR suite	Highly likely	13	54.2
	On transfer to the OR	Highly likely	13	54.2
	On transfer to recovery	Highly likely	12	50
	On discharge of the patient from recovery	Highly likely	13	54.2
	Whenever the patient is repositioned	Highly likely	9	37.5
	Whenever the patient's condition changes	Highly likely	12	50
	Whenever pressure damage is identified	Highly likely	15	62.5
			n=24	**99.9%**

4.8.7 Question 34: On admission of a patient to the operating suite, how likely is it that you would participate in the following actions as part of nursing handover?

Most of the participants (54.2%: n=13) indicated that the PU risk assessment score is *highly likely* to be sighted in the notes; that it is calculated at handover (50%: n=12) and that it is calculated and documented in the notes at handover (54.2%: n=13).

For the reporting of the PU risk assessment score, almost forty-two percent of the sample (41.7%: n=10) were *highly likely* to verbally report the patient's PU risk assessment score, followed by five participants (20.8%: n=5) who answered *likely* or *not applicable in my role* respectively. One participant (4.2%: n=1) answered *highly unlikely* and three (12.5%: n=3) answered *unlikely.*

The documentation of the patient's skin condition where *highly likely* to be sighted in the notes by less than forty percent of the participants (37.5%: n=9) or verbally reported by half the participants (50%: n=12). The patient's skin condition is *highly likely* to be examined during handover by the majority of the participants (62.5%: n=15). The table on the following page depicts the frequencies of the responses.

Table 4.26: The actions participated in as part of nursing handover on admission of a patient to the operating suite

Variables	Categories		Frequency n	Percentages %
On admission of a patient to the operating suite, how likely is it that you would participate in the following actions as part of nursing handover?	The patient's PU risk assessment score is sighted in the notes	Highly likely	13	54.2
	The patient's PU risk assessment score is reported verbally	Highly likely	10	41.7
	The patient's PU risk assessment score is calculated during handover	Highly likely	12	50
	The patient's PU risk assessment score is calculated and documented in the notes during handover	Highly likely	13	54.2
	Documentation of the patient's skin condition is sighted in the notes	Highly likely	9	37.5
	The patient's skin condition is reported verbally	Highly likely	12	50
	The patient's skin condition is examined during handover	Highly likely	15	62.5
			n=24	**99.9%**

4.8.8 Question 35: On transfer of a patient from the operating room to recovery, how likely is it that you would participate in the following actions as part of nursing handover?

Most of the participants (62.5%: n=15) indicated that the PU risk assessment score is highly likely to be sighted in the notes. Less than fifty percent indicated that that it is highly likely to be calculated at handover (16.7%: n=4) and that it is calculated and documented in the notes at handover (4.2%: n=1) and that the patients skin condition is highly likely to be examined during handover (4.2%: n=1). Three participants selected that it was highly likely that the patients skin condition is reported verbally (12.5%: n=3) and that the condition of the skin is examined during handover (12.5%: n=3). The table depicting the results can be found on the next page.

Table 4.27: The actions participated in as part of nursing handover from the operating room to the recovery staff

Variables	Categories		Frequency n	Percentages %
On admission of a patient to the operating suite, how likely is it that you would participate in the following actions as part of nursing handover?	The patient's PU risk assessment score is sighted in the notes	Highly likely	15	62.5
	The patient's PU risk assessment score is reported verbally	Highly likely	3	12.5
	The patient's PU risk assessment score is calculated during handover	Highly likely	4	16.7
	The patient's PU risk assessment score is calculated and documented in the notes during handover	Highly likely	1	4.2
	Documentation of the patient's skin condition is sighted in the notes	Highly likely	9	37.5
	The patient's skin condition is reported verbally	Highly likely	3	12.5
	The patient's skin condition is examined during handover	Highly likely	3	12.5
			n=24	**99.9%**

4.8.9 Question 36: On discharge of a patient from the operating suite/recovery, how likely is it that you would participate in the following actions as part of nursing handover?

For this question as depicted in the table on the following page, less than forty-two percent of the participants indicated that it was *highly likely* that they would participate in the actions as described. Nine participants (37.5%: n=9) chose the option that it was *highly likely* that the score is calculated and documented in the notes during handover. Eight participants responded to *the score is calculated during handover* (33.3%: n=8); *the skin condition is examined during handover* (33.3%: n=8) and *the skin condition is examined and documented in the notes during handover* (33.3%: n=8). The table depicting the results can be found on the next page.

Table 4.8: Participation in nursing handover actions on discharge of a patient from the operating suite/recovery

Variables	Categories		Frequency n	Percentages %
On discharge of a patient from the OR/recovery, how likely is it that you would participate in the following actions as part of nursing handover?	PU score is sighted in the notes	Highly likely	10	41.7
	PU score is reported verbally	Highly likely	10	41.7
	PU score calculated during handover	Highly likely	8	33.3
	PU score is calculated and documented in the notes during handover	Highly likely	9	37.5
	Documentation of the skin condition is sighted in the notes	Highly likely	10	41.7
	The skin condition is examined during handover	Highly likely	8	33.3
	The skin condition is examined and documented in the notes during handover	Highly likely	8	33.3
			n=24	**99.9%**

4.8.10 Question 37: Do you liaise with anyone for advice on the management of patients at risk of pressure ulcers?

Half the participants indicated they *sometimes* get advice (50%: n=12), nine checked the option for *always* (37.5%: n=9) and three selected *most of the time* (12.5%: n=3)

Table 4.28: Liaising with anyone for advice on the management of patients at risk of pressure ulcers

Variables	Categories	Frequency n	Percentages %
Do you liaise with anyone for advice on the management of patients at risk of pressure ulcers?	Sometimes	12	50
	Always	9	37.5
	Most of the time	3	12.5
		n=24	**99.9%**

4.8.11 Question 38: Do you have equipment/devices to assist you to lift/position patients in your department?

For this question most of the participants (70.8%: n=17) answered *yes*, followed by 16.7% (n=4) who answered *no* and 12.5% (=3) were *unsure.* The table depicting the results can be found on the next page.

Table 4.28: Lifting/positioning equipment/devices

Variables	Categories	Frequency n	Percentages %
Do you have equipment/devices to assist you to lift/position patients in your department?	Yes	17	70.8
	No	4	16.7
	Unsure	3	12.5
		n=24	**99.9%**

4.8.12 Question 39: Approximately, how often are patients repositioned intraoperatively?

Most of participants (45.8%: n=11) answered that it is *not usually possible to reposition patients intraoperatively*, however 29.2% (n=7) answered *2-4 hourly*, followed by 20.8% (n=5) participants answered *unsure how often patients are repositioned intra operatively* and 4.2%(n=1) responded *when necessary* (PRN).

Table 4.29: Frequency in which are patients repositioned intraoperatively

Variables	Categories	Frequency n	Percentages %
Approximately, how often are patients repositioned intra operatively?	2-4 Hourly	7	29.2
	PRN (when necessary)	1	4.2
	Unsure	5	20.8
	It is usually not possible to reposition patients intra operatively	11	45.8
		n=24	**99.9%**

4.8.13 Question 40: Approximately, how often are patients repositioned postoperatively in recovery?

Four participants (16.7%: n=4) selected the patients *are repositioned when necessary (PRN)* and the option of *it is not necessary to reposition the patients* was selected by another seven participants (29.2%: n=7). Twenty-five percent (n=6) were *unsure.*

Table 4.29: Frequency in which patients are repositioned postoperatively in recovery

Variables	Categories	Frequency n	Percentages %
Approximately, how often are patients repositioned postoperatively?	2-4 Hourly	4	16.7
	PRN (when necessary)	7	29.2
	Unsure	6	25.0
	It is usually not necessary to reposition patients in recovery	7	29.2
		n=24	**99.9%**

4.8.14 Question 41: What pressure ulcer interventions and devices do you use most frequently for reducing/relieving patients' pressure?

Table 4.29 below shows the results for this question: 66.7% (n=16) selected *pillows* are used and almost 17 percent indicated that a *gel pad is place underneath the body*. Two participants selected *doughnut air pillow* and only one participant selected the use of *blankets and the egg crate*, each.

Table 4.30: Type of pressure ulcer interventions and devices used most frequently for reducing/relieving patient's pressure

Variables	Categories	Frequency	Percentages
		n	**%**
What pressure ulcer interventions and devices do you use most frequently for reducing / relieving patient's pressure?	Pillows	16	66.7
	Blankets	1	4.2
	Doughnut air pillows	2	8.3
	Egg crate underneath body	1	4.2
	Gel pad underneath body	4	16.7
		n=24	**99.9%**

4.9 SUMMARY

The findings showed that the participants have some knowledge of the prevention of PIs. Their practices or interventions for the prevention of injuries indicates that a uniform standard in the research setting is lacking. Finally, regular education is needed to improve their knowledge and clinical practice for pressure ulcer prevention and management in the study setting.

4.10 CONCLUSION

In this chapter, the results and statistical analyses of the data obtained from the survey were presented and reported on. The aim and the objectives for the study were to determine the knowledge of the OR nurses and anaesthetic technicians on the prevention of PIs, their clinical practice and to identify whether a relationship existed between educational opportunities, and their knowledge of departmental guidelines.

In Chapter 5, the findings are discussed according to the objectives of the study. The conclusions deduced from the results will be described, including the limitations of the study. Recommendations will be made based on the findings.

CHAPTER 5: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

Ezeamuzie *et al.*, (2019:1) and Tallier *et al.*, (2017:106) assert that the studies on OR PIs are limited and that it is imperative that exploration of specific scenarios is conducted. To this end, the aim of this study was to determine the knowledge, attitude and practices of nurses regarding the prevention of PIs in perioperative patients in a Middle East OR department. The objectives for the study were to determine the knowledge of the participants on the prevention of PIs, to determine the practices of the OR nurses on the prevention of them and to identify whether a relationship exists between educational opportunities, and their knowledge of departmental guidelines.

In this chapter, the conclusions on the results reported in the previous chapter will be discussed. Recommendations based on the study results and limitations will determine future research studies.

5.1.1 Demographic profile

Most of the participants were specialist-trained staff nurses, managers or educators in the OR. The registered nurses who were not specialist-trained OR nurses worked in the recovery area. Two anaesthetic technicians and two level 3 registered nurses with limited training of 2 years participated. They were all employed fulltime. Most of them had 10-15 years of experience. According to Benner's theory on nursing development, this places them in stage 4 as proficient and Stage 5 as expert (George, 2014:612-613). Their years of experience should demonstrate high clinical skills and knowledge on positioning strategies, prevention of pressure injuries, documentation and verbal transference of the patient's skin status. Furthermore, as proficient or expert nurses, they should be responsible for overseeing the quality of patient care delivered by the less experienced nurses in the study setting.

5.1.2 Objectives of the study

The objectives of the study were to determine the knowledge of the OR nurses and anaesthetic technicians on the prevention of PIs, the practices of the participants on the prevention of PIs and to identify whether a relationship existed between educational opportunities and their knowledge of departmental guidelines.

5.1.2.1 Attendance of educational opportunities: The results demonstrate that half the participants indicated that they had attended formal education on PUs within the last 2 years. This is a concern since all the participants had been employed in the research setting for five years or more and

therefore it can be deduced that frequent formal educational opportunities may have been absent. Furthermore, from an employment contractual perspective, the employer should make these opportunities obligatory for enhancing or maintaining skill competencies among the nursing staff.

There is some discrepancy between the participants reported attendance of educational opportunities and the type of education they received. The majority reported that they had received clinical instruction in the past 2 years while almost forty-six percent indicated they had not attended orientation, clinical instruction, in-service, seminar/workshops or formal study. Furthermore, the majority reported they had attended an education opportunity of only thirty minutes duration. Few participants attended training on positioning risks, equipment and surgical positions, yet the majority attended training on the protocols and policies.

5.1.2.2 Policies and guidelines: While the policies and guidelines were easily accessible to all the participants thirteen indicated that they consult these documents only occasionally. While reiteration of the hospital's protocols and policies are vital for quality control, knowledge of prevention measures is critical. The majority responded that they had never read something specifically related to the risk and management of PUs for perioperative patients, yet they half had consulted the hospital policy on the risk and management of PUs in the perioperative patients. It can be inferred that the hospital policy may not provide enough detail on the assessment and risk management for the edification of the OR staff in the study setting.

5.1.2.3 Pressure ulcer stages and grading: Data included questions related to the participant's knowledge on stages of PUs that included self-reported answers to the staging/grading of PU development as described in the literature. Participants should have been able to identify the four stages of PIs. However, the results showed that many of the participants indicated that they were somewhat familiar with the stages, yet many confused the stages which can be interpreted that they are unable to identify the early presentation of tissue injury. This is supported by Prentice, Stacey and Lewin who reported that some studies report that nurses' knowledge is inadequate, does not reflect the current evidence of clinical practice and that evidence-based strategies are not always applied in clinical practice (Primary Intention 2002:87). Furthermore, the actions a staff member would take on identifying the patient has developed a stage 1 PU on the heels, was inadequate. Only two participants would reposition the limb on a pressure relieving device, notify the nurse at handover and document the observation in the notes/charts. It is also noted that only one participant indicated that he/she would apply a dressing, mark the area of tissue damage and complete an incident report. The

reporting of observed tissue damage is essential in order to afford the patient optimal treatment and to raise awareness amongst the OR team.

5.1.2.4 Assessment of risk, management and communication of assessment/treatment and interventions: Not all the participants routinely assess the patients for PU risk. The majority of the participants indicated that *none of the above* options for the reason why they do not perform assessments. Documentation of the PU risk assessment score is unclear according to the participants selections. Almost 30% indicated they are unsure where to document the risk assessment. The PU risk assessment tool is highly likely to be used by the 54% of the participants and is completed by half the participants. This tool should be obligatory for all admitting or discharging staff in the OR.

On discharge of the patient from the OR/recovery, less than half the participants indicated that they would *highly likely* participate in the seven options provided. The protocol at handover between staff should be mandatory to communicate and document the patient's condition. Furthermore, liaising with other members in the unit on the management of patients at risk should be encouraged since only half the participants indicated they do so.

5.1.2.2 Determining the practices of the operating room nurses on the prevention of pressure injuries

An Australian survey amongst 2113 registered nurses found that only 30% of them documented the assessment and treatment of PIs; while 53% followed repositioning guidelines and over 50% used the outdated practice of water-filled gloves to alleviate pressure (Sutherland-Fraser, 2012:11:25).

In the study setting, pressure injuries appeared to not be consistently reported, since less than half the participants were *highly likely* to verbally report the patient's PU risk assessment score. This undermines the efforts of the hospital in which this study took place, to address patient safety issues. It can also be deduced that the level of communication between the members of the OR team requires remediation.

In addition to verbal reports between members of the team, documentation of the patient's skin condition is imperative on admission to the OR prior to surgery, on discharge from the OR to the recovery area and on handover of the patient to the ward staff. The findings in this study indicated that the participants were *highly likely* and *likely* to document the skin condition. Incident reporting is part of reducing the recurrence of PIs, therefore accurate documentation is essential.

The consequences of poor patient positioning are a global concern as the outcome can be temporary or permanent with significant costs to the patient's quality of life (Burlingame, 2017:228). Prentice and Stacey (2002:87-109) found that the introduction of PI clinical practice guidelines combined with a comprehensive and continuous education PI program, significantly reduced pressure injury. Perioperative nurses in the study setting have been unevaluated when it comes to improving knowledge on this form of adverse event. The researcher could not locate studies that had specifically targeted peri-operative nurses.

5.1.2.3 Identifying whether a relationship exists between educational opportunities and their knowledge of departmental guidelines.

Questions posed in this study related to the participants education on PIs, positioning, risks and management of PIs, be it formal or informal training, the type of education received and the duration of the education in total. Working in a multicultural setting where the basic training of nurses in their country of origin appears to differ, orientation is important for safe patient care to minimise the risk of PIs. The findings from this study indicate that only half of the participants had received formal education on PIs within the last 2 years. Most of the participants had been working in the research setting for more than 5 years. Therefore, they should have attended the general orientation at the commencement of their contract in the organization. Furthermore, an annual general hospital competency evaluation, whereby the knowledge and practice for PI prevention and management could have been optimized, appears to have been overlooked. These statistics are of great concern, as it indicates that no in-service training has been provided, and therefore continuing professional development or training on PI has been neglected. It can be deduced that the study setting cannot rely on the OR staff to take the initiative in maintaining their knowledge and clinical skills for PUs. It is therefore incumbent on the hospital management to implement compulsory training and educational opportunities. This was confirmed as a statistically significant result was calculated that indicates that there is an association between educational opportunities and the participants knowledge of departmental guidelines.

5.2 LIMITATIONS OF THE STUDY

Limitations of a research study refers to the restrictions in a study that may decrease the credibility and generalisability of the results (Burns & Grove, 2011:37).

The population (N=28) and the final sample was n=24 of the nurses and anaesthetic technicians working in a Middle East hospital, following the exclusion of the 3 pilot test participants. However,

the findings may be of interest to other hospitals in the study setting's organization to address this issue.

5.3 CONCLUSIONS

In this chapter the results of the study were discussed according to the objectives. The aim of this study was to determine the knowledge, and practices of nurses and anaesthetic technicians regarding the prevention of PIs in perioperative patients in a Middle Eastern hospitals OR department. The results of the study are supported by Patricia Benner's model of nursing practice. Since the majority of the participants have more than five years of experience after qualification, it was expected that they should be able to determine basic needs in turning a patient, knowledge on basic anatomy and departmental guidelines.

5.4 RECOMMENDATIONS

Based on the research study results, the researcher recommends the following strategies to improve the knowledge and practices to PIs in perioperative patients.

5.4.1 Training courses in positioning of patients and the stages of PIs

The researcher recommends formal and informal training should be introduced to address the lack of knowledge in identifying the different positions required for specific operations and the different positioning functions of the operating tables. For example, the table position for Trendelenburg/reverse Trendelenburg or the sitting position. Furthermore, knowledge of the stages of PIs is essential in the prevention and management of patients at risk of injury. Training and education should include the use of the NORTON SCALE, the Venous Thrombo-embolism form and the revision of policies and procedure guidelines for the positioning of patients to prevent PIs.

5.4.2 Recommendations for future research

This research study has created baseline data related to the knowledge and practices of the participants for preventing PIs perioperatively. The researcher recommends the following research opportunities:

- Further research is indicated to identify what the inhibiters and enablers are of handover of the patient's condition and documentation in the study setting.
- Conduct an audit of nursing records to establish the accuracy of the implementation of incident reporting and initiating the NORTON scale as part of preoperative checklist.
- Conduct a before and after an intervention study following the implementation of a training programme, to determine if there had been any significant change in the participants' knowledge and practices after training.

- Further research is recommended in the research setting's group of hospitals in the Middle East to establish whether the knowledge of the healthcare workers is current in the prevention and management of PIs in the OR. This may contribute to a group-level implementation of in-service training underpinned by a policy.
- A study evaluating the efficacy of in-service on the topic followed by an observational study may identify further opportunities of criteria-specific continuing professional training.
- Finally, the survey instrument was lengthy. The survey could be re-evaluated in terms of the constructs that it measures using statical computer software to shorten it.

5.5 DISSEMINATION

The findings of this research have been requested by the senior management of the hospital group. Furthermore, it will be presented at a congress on wound care in the Kingdom of Saudi Arabia. It is planned that an article will be published in a Middle Eastern journal of wound care.

5.6 CONCLUSION

This chapter included a discussion on the results according to the study objectives. The aim of the study was to determine the nurses and anaesthetic technician's knowledge and clinical practice for the prevention and management of PIs in the OR. The findings demonstrate that there is a lack in knowledge and clinical practice among nurses and the anaesthetic technicians that warrants remedial training interventions.

REFERENCES

Abdalmageed, O.S., Bedaiwy, M.A. & Falcone, T. 2017. Nerve Injuries in Gynecologic Laparoscopy. *Journal of Minimally Invasive Gynecology*. 24(1):16–27.

Alavi, A. (in press). Foundations of Best Practice Prevention and Management of Pressure Injuries. *Canadian Association of Wound Care*. (February):1=63.

Alshaya, A.K., Alsayegh, A.K., Alshaya, H.K., Almutlaq, B.A., Alenazi, N.S.G., Rasheedi, H.M.A. Al, Albaqawi, S.K.M., Alshammari, N.K.S., et al. 2017. The Common Complications and Comorbidities among Saudi Diabetic Patients in Northern Saudi Arabia. *Open Journal of Endocrine and Metabolic Diseases*. 07(07):151–161.

Babin, B.J. & Zikmund, W.G. 2016. *Exploring Marketing Research*. 11th ed. Boston: Cengage Learning.

Blomberg, A.-C., Bisholt, B. & Lindwall, L. 2018. Responsibility for patient care in perioperative practice. *Nursing Open*. 5(3):414–421.

Bohnen, J.D., Mavros, M.N., Ramly, E.P., Chang, Y., Yeh, D.D., Lee, J., de Moya, M., King, D.R., et al. 2016. Intraoperative Adverse Events in Abdominal Surgery. *Annals of Surgery*. 265(6):1119–1125.

Bonnaig, N., Dailey, S., Archdeacon, M. 2014. Positioning the surgical patient. *The Journal of Bone and Joint Surgery-American Volume*. 196(1):1135–1140.

Bouyer-Ferullo, S. 2013a. Preventing Perioperative Peripheral Nerve Injuries. *AORN Journal*. 97(1):110-124.e9.

Bouyer-Ferullo, S. 2013b. Preventing Perioperative Peripheral Nerve Injuries. *AORN Journal*. 97(1).

Burlingame, B.L. 2017. Guideline Implementation: Positioning the Patient. *AORN Journal*. 106(3):227–237.

Carlson, D.S. 2012. Preventing deep vein thrombosis in perioperative patients. *OR Nurse*. 6(5):1–6.

Croke, L. 2019. Essential strategies for safe patient positioning. *AORN Journal*. 110(5):P11–P15.

Edgcombe, H., Baxter, L.S., Kudsk-Iversen, S., Thwaites, V. & Bulamba, F. 2019. Training non-physician anaesthetists in sub-Saharan Africa: A qualitative investigation of providers' perspectives. *BMJ Open*. 9(3):1–8.

Edsberg, L.E., Black, J.M., Goldberg, M., McNichol, L., Moore, L. & Sieggreen, M. 2016. Revised National Pressure Ulcer Advisory Panel Pressure Injury Staging System. *Journal of Wound, Ostomy and Continence Nursing*. 43(6):585–597.

Ezeamuzie, O., Darian, V., Katiyar, U. & Siddiqui, A. 2019. Intraoperative use of low-profile alternating pressure mattress for prevention of hospital acquired pressure injury. *Perioperative Care and Operating Room Management*. 17:100079–100080.

Ginsburg, K.B., Pape, K., Heilbronn, C., Levin, M. & Cher, M.L. 2018. Prospective assessment of positioning-related pain in robotic urologic surgery. *Journal of Robotic Surgery*. 12(1):97–101.

Grove, S.K., Burns, N. & Gray, J.R. 2013. *The practice of nursing research. Appraisal, synthesis and generation of evidence.* 7th ed. St Louis: Elsevier SaundersSt.

Guo, Y., Zhao, K., Zhao, T., Li, Y., Yu, Y. & Kuang, W. 2019. The effectiveness of curvilinear supine position on the incidence of pressure injuries and interface pressure among surgical patients. *Journal of Tissue Viability*. 28(2):81–86.

Ingvarsdottir, E. & Halldorsdottir, S. 2018. Enhancing patient safety in the operating theatre: from the perspective of experienced operating theatre nurses. *Scandinavian Journal of Caring Sciences*. 32(2):951–960.

Kong, H. & West, S. 2013. WMA Declaration of Helsinki – ethical principles for medical research involving human subjects. (October 1975).

Levy, B. & Mobasheri, M. 2017. Principles of safe laparoscopic surgery. *Surgery (United Kingdom)*. 35(4):216–219.

Lin, L.M. 2015. Establishing safety standards in liver transplantation operating room nursing care. *Perioperative Care and Operating Room Management*. 1(1–2):9–12.

Lin, S., Hey, H.W.D., Lau, E.T.C., Tan, K.-A., Thambiah, J.S., Lau, L.-L., Kumar, N., Liu, K.-P.G., et al. 2017. Prevalence and Predictors of Pressure Injuries From Spine Surgery in the Prone Position. *SPINE*. 42(22):1730–1736.

Lindfors, K. & Junttila, K. 2014. The effectiveness of orientation programs on professional competence and organizational commitment of newly graduated nurses in specialized health care: A systematic review protocol. *JBI Database of Systematic Reviews and Implementation Reports*. 12(5):2–14.

Lumbley, J.L., Ali, S.A. & Tchokouani, L.S. 2014. Retrospective review of predisposing factors for intraoperative pressure ulcer development. *Journal of Clinical Anesthesia*. 26(5):368–374.

Mantzoukas, S. & Jasper, M. 2008. Types of nursing knowledge used to guide care of hospitalized patients. *Journal of Advanced Nursing*. 62(3):318–326.

Mlambo, M., Silén, C. & McGrath, C. 2021. Lifelong learning and nurses' continuing professional development, a metasynthesis of the literature. *BMC Nursing*. 20(1):1–13.

Neo, T.G., Koo, S.H., Chew, S.T.H., Png, G.K., Lacuesta, M.J., Wu, M.Y.L.., Tay, R.Y.C., Singh, P.A., et al. 2021. A randomized controlled trial to compare the interface pressures of alternating pressure overlay with gel pad versus gel pad alone during prolonged surgery. *Journal of Tissue Viability*. 30(2):222–230.

Peixoto, C. de A., Ferreira, M.B.G., Felix, M.M.D.S., Pires, P. da S., Barichello, E. & Barbosa, M.H. 2019. Risk assessment for perioperative pressure injuries. *Revista Latino-Americana de Enfermagem*. 27(3e3117):1–11.

Polit, D.F. & Beck, C.T. 2018. *Essentials of nursing research.* Philadelphia: Wolters Kluwer.

Prentice, J.L., Stacey, M.C. & Lewin, G.P. 2003. An Australian model for conducting pressure ulcer prevalence surveys. *Primary Intention: The Australian Journal of Wound Management*. 11(2):87–96. [Online], Available: http://search.ebscohost.com.proxy-ub.rug.nl/login.aspx?direct=true&db=cin20&AN=106714073&site=ehost-live&scope=site [2019, October 09].

Rav-Marathe, K., Wan, T.T.H. & Marathe, S. 2016. A systematic review on the KAP-O framework for diabetes ducation and research. *Medical Research Archives*. 4(1).

Riemenschneider, K.J. 2018. Prevention of Pressure Injuries in the Operating Room: A Quality Improvement Project. *Journal of Wound, Ostomy and Continence Nursing*. 45(2):141–145.

Rowen, B.L. & Johnson, K.L. 2012. Managing in the OR. *OR Nurse*. 26–35.

Spruce, L. 2017. Back to Basics: Preventing Perioperative Pressure Injuries. *AORN Journal*. 105(1):92–99.

Sukhu, T. & Krupski, T.L. 2014. Patient positioning and prevention of injuries in patients undergoing laparoscopic and robot-assisted urologic procedures. *Current Urology Reports*. 15(4):2–7.

Sutherland-Fraser, S., McInnes, E., Maher, E. & Middleton, S. 2012. Peri-operative nurses' knowledge and reported practice of pressure injury risk assessment and prevention: A before-after intervention study. *BMC Nursing*. 11(25):1–10.

Welch, M.B., Brummett, C.M. & Shanks, A.M. 2009. Perioperative Peripheral Nerve Injuries. *Anesthesiology*. 111(3):490–497.

Woodfin, K.O., Johnson, C., Parker, R., Mikach, C., Johnson, M. & McMullan, S.P. 2018. Use of a novel memory aid to educate perioperative team members on proper patient positioning technique. *AORN Journal*. 107(3):325–332.

APPENDICES

Appendix A: Health Research Ethics Committee of Stellenbosch University

UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

Approval Notice New Application

18/01/2021

Project ID :17184

HREC Reference No: S20/07/182

Project Title: Nurses' Knowledge and Clinical Practices related To Peri- Operative

Pressure Injuries in A Middle Eastern Hospital.

Dear Miss Alida Martins

The **submission** received on 07/12/2020 was reviewed by members of **Health Research Ethics Committee via expedited** review procedures on 18/01/2021. The committee is satisfied with your response and you have been granted **full approval.**

Please note the following information about your approved research protocol:

Protocol Approval Date: 20 November 2020

Protocol Expiry Date: 19 November 2021

Please remember to use your Project ID 17184 and Ethics Reference Number S20/07/182 on any documents or correspondence with the HREC concerning your research protocol.

Please note that the HREC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review

Translation of the informed consent document(s) to the language(s) applicable to your study participants should now be submitted to the HREC.

Please note you can submit your progress report through the online ethics application process, available at: Links Application Form Direct Link and the application should be submitted to the HREC before the year has expired.
Please see *Forms and Instructions* on our HREC website (www.sun.ac.za/healthresearchethics) for guidance on how to submit a progress report.

The HREC will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly for an external audit.

Please note that for studies involving the use of questionnaires, the final copy should be uploaded on Infonetica.

Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility, permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol.
Please consult the Western Cape Government website for access to the online Health Research Approval Process, see: https://www.westerncape.gov.za/general-publication/health-research-approval-process. Research that will be conducted at any tertiary academic

institution requires approval from the relevant hospital manager.
Ethics approval is required BEFORE approval can be obtained from these health authorities.

We wish you the best as you conduct your research.

For standard HREC forms and instructions, please visit: Forms and Instructions on our HREC website https://applyethics.sun.ac.za/ProjectView/Index/17184

If you have any questions or need further assistance, please contact the HREC office at 021 938 9677.

Yours sincerely, Mrs. Melody Shana Coordinator HREC1

National Health Research Ethics Council (NHREC) Registration Number:

REC-130408-012 (HREC1)•REC-230208-010 (HREC2)

Federal Wide Assurance Number: 00001372
Office of Human Research Protections (OHRP) Institutional Review Board (IRB) Number: IRB0005240 (HREC1)•IRB0005239 (HREC2)
The Health Research Ethics Committee (HREC) complies with the SA National Health Act No. 61 of 2003 as it pertains to health research. The HREC abides by the ethical norms and principles for research, established by the World Medical Association (2013). Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects; the South African Department of Health (2006). Guidelines for Good Practice in the Conduct of Clinical Trials with Human Participants in South Africa (2nd edition); as well as the Department of Health (2015). Ethics in Health Research: Principles, Processes and Structures (2nd edition).

The Health Research Ethics Committee reviews research involving human subjects conducted or supported by the Department of Health and Human Services, or other federal departments or agencies that apply the Federal Policy for the Protection of Human Subjects to such research (United States Code of Federal Regulations Title 45 Part 46) ; and/or clinical investigations regulated by the Food and Drug Administration (FDA) of the Department of Health and Human Services.

Appendix B: Institution Review Board Approval

[redacted] Hospitals [redacted] Province
Institutional Review Board (IRB)

العلمي البحث لأخلاقيات الدائمة اللجنة

PSMCHS, P.O. Box 33048, Dammam 31148, [redacted] Region, Saudi Arabia, Tel. 013.8405487/8405490
KACST Registration HA-05-DH-075

IRB Protocol No.	**AFHER-IRB-2020-026**		
Protocol Title	**A Perioperative Team's Knowledge and Clinical Practices in Prevention of Pressure Injuries in a Middle Eastern Hospital**		
Principal Investigator	**Alida Margaretha Martins**	**Co-Investigators**	---
Institution	[redacted] Hospital	**Department**	Nursing
IRB Review Date	July 23, 2020	**Effective Date**	August 30, 2020
IRB Review Action	**APPROVED**	**Expiration Date**	August 29, 2021

Thank you for submitting your application to the [redacted] Hospitals [redacted] Region Institutional Review Board (IRB).

The IRB has determined that your proposed project employs a cross-sectional single case study that pose less than minimal risk to the participants. The information will be obtained in such a way that one's responses will not be linked to one's identify or identifying information. The application was reviewed as exempted and approved. Please refer to the IRB Protocol number denoted above in all communications related to your application and this approval.

Approval is given for one year from the date of approval. Projects, which have not commenced within one year of the original approval or any changes on the approved protocol, must be re-submitted to the Institutional Review Board (IRB) Committee. If you are unable to complete your research within the validation period, you will be required to request an extension from the IRB Committee**.** *Please note that the approval of this protocol will lapse on 29 August 2021. You have to re-apply for another IRB before the expiry since your study duration is two years.*

Approval is given on the understanding that the "KACST Implementing Regulations of the law of Ethics of Research" are adhered to. **Accordingly, the principal investigator must submit progress/final report to the IRB Office once you completed your study**. The IRB extend their best wishes for the successful completion of this study.

MOHAMMED D. ALAHMARI, PhD, FAARC, FCCP
Chairman of the Institutional Review Board

Cc: IRB File

Appendix C: Director of Nursing: departmental approval for undertaking a research study

FORM: Departmental Approval for Undertaking a Research Study موافقة القسم على إجراء دراسة بحثية		
Number	**Date**	**Page No.**
IRB-FORM-005	5-Jul-2018	Page 63 of 1

Title of the Proposal: Knowledge and clinical practices related to pressure injuries in a Middle Eastern Hospital **Investigator's Name:** Alida Margaretha Martins **To: Chairman of Institutional Review Board** Greetings, We consent for the above-mentioned research study to be conducted in our department. The department council has reviewed the submitted study proposal and confirms that (please check all): The study objectives are important and in line with the department's research scope. The study justification is robust and scientifically plausible. The design, sampling technique, procedures and data analysis are justified, accurate and based on recently published literature. Best regards. **Department:** Director of Nursing **Department Head:** Ms Violet Mokoena **Signature:** **Date:** 5 January 2020	**عنوانالمقترحالبحث**: **أسمالباحث:** **إلى: رئيسلجنةأخلاقياتالبحث** السلامعليكمورحمةاللهوبركاتة: نودإفادتكمبموافقتناعلىإجراءالدراسةالبحثيةالمذكورةأعلاهفيالقسمالتابعةلنا. فضلاً الترجمة هنا وتقبلواتحياتنا. **القسم:.** **رئيسالقسم:** **التوقيع:** **التاريخ:**

Appendix D: Participant information leaflet and consent form for online survey

TITLE OF RESEARCH PROJECT: Knowledge and clinical practices related to peri-operative pressure injuries in a Middle Eastern hospital.

Project Id: 17184 / **Ethics Reference No:** S20/07/182

LETTER OF INTRODUCTION, INSTRUCTIONS AND CONSENT TO PARTICIPATE

Dear study participant

Thank you for supporting this research project which aims to determine your knowledge and clinical practice of peri-operative pressure ulcer prevention and management.

This survey is anonymous which means that neither the researcher nor any other person will be able to know who completed the survey. Your name is not required. The researcher is bound by the ethical principles of confidentiality, anonymity and secrecy. Your participation is voluntary and you are under no obligation to participate if you do not want to. This is an online survey managed by the Information Technology service of the University of Stellenbosch.

Section 1 asks you 5 questions about your career.

Sections 2-5 asks you 35 questions on your knowledge of pressure ulcer prevention in the OR.

It will take about 20 minutes to complete.

Please read each question carefully and answer it to the best of your ability. It is important that you answer these questions based on your own knowledge, so please do not consult with others or refer to texts on the subject matter. Please check an option to indicate the most accurate response to the statement or question. If indicated, you may check more than one option.

At the bottom of this page, you are required to please select "yes" or "no" to proceed to the survey. If you select "no" you will not be able to read the survey.

This research is important for patient care in our OR department.

Do not hesitate to contact Alida Martins on 0503627203 if you have any questions.

Thank you.

Alida Martins

Master's in Nursing student at the University of Stellenbosch, Department of Nursing and Midwifery, South Africa.

Consent to participate:

- **Yes**
- **No**

Appendix E: Data collection survey

Title: Knowledge and clinical practices related to peri-operative pressure injuries in a Middle Eastern hospital.

Instructions: Please check an option to indicate the most accurate response to the statement or question. If indicated in the question, you may check more than one option.

SECTION 1: DEMOGRAPHIC PROFILE

1. Please indicate your main area of practice (Check more than one box if relevant)

Anaesthetics	Scrub	Recovery	Circulating nurse	Education / Management
❑1	❑2	❑3	❑4	❑4

2. Please indicate your Designation (Check one box only)

Staff nurse	RN1	RN2	RN3	Anaesthetic Technician
❑1	❑2	❑3	❑4	❑5

3. Please indicate the year of your first nursing qualification

4. Please indicate your Employment Status (Check one box only)

Full-time	Part-time
❑1	❑2

5. Please indicate your usual shifts (Check more than one box if relevant)

07h00-16h00	07h00-19h00	Nights only	Weekends only
❑1	❑2	❑4	❑5

SECTION 2: EDUCATION AND TRAINING ON PRESSURE ULCER PREVENTION AND POSITIONING

6. Have you received any formal education on ***pressure ulcers*** within the last 2 years? (Check one box only)

Yes	No
❑1	❑2

7. If yes, please identify the type of education. (Check more than one box if relevant)

Orientation	Clinical instruction	Inservice	Seminar/workshop	Formal study	None of the above
❑1	❑2	❑3	❑4	❑5	❑6

8. Please identify the approximate duration of the education in total. (Check one box only)

½ hour	1 hr	1-4 hrs	1 day	Longer

❑1	❑2	❑3	❑4	❑5

9. Please identify the content of the education. (Check more than one box if relevant)

Pressure Ulcer aetiology	Risk factors	Risk assessment tools	Prevention measures	Protocols & policies	None of the above
❑1	❑2	❑3	❑4	❑5	❑6

10. When did you last read something specifically related to the risks and management of pressure ulcers for perioperative patients? (Check one box only)

<3mths	< 4-12mths	>1 year	Can't recall	Never
❑1	❑2	❑3	❑4	❑5

11. What did you last read that specifically related to the risks and management of pressure ulcers for perioperative patients? (Check more than one box if relevant)

Internal Department Policy	Hospital Policy	Area Health Service Policy	NSW Health Policy	WCANSW: Wound Care Assoc of NSW Guidelines
❑1	❑2	❑3	❑4	❑5

AWMA: Australian Wound Management Assoc Guidelines	NPIAP: National Pressure Ulcer Advisory Panel Position Statements	EPIAP: European Pressure Ulcer Advisory Panel Guidelines	Joanna Briggs: Best Practice Sheets	Systematic Reviews (e.g., Cochrane Reviews etc)
❑6	❑7	❑8	❑9	❑10

ACORN: Perioperative Nursing Standards	AORN: Perioperative Standards and Recommended Practices	Product literature	Journal or Textbook	None of the above
❑11	❑12	❑13	❑14	❑15

12. Have you received any formal education on ***patient positioning*** within the last 2 years? (Check one box only)

Yes	No
❑1	❑2

13. If yes, please identify the type of education (Check more than one box if relevant)

Orientation	Clinical instruction	Inservice	Seminar/workshop	Formal study	None of the above
❑1	❑2	❑3	❑4	❑5	❑6

14. Please identify the approximate duration of the education in total (Check one box only)

½ hour	1 hr	1-4 hrs	1 day	Longer
❑1	❑2	❑3	❑4	❑5

15. Please identify the content of the education (Check more than one box if relevant)

Anatomy & physiology	Positioning risks	Positioning equipment	Surgical positions	Protocols & policies	None of the above
❑1	❑2	❑3	❑4	❑5	❑6

16. When did you last read something specifically related to ***positioning*** of perioperative patients? (Check one box only)

<3mths	< 4-12mths	>1 year	Can't recall	Never
❑1	❑2	❑3	❑4	❑5

17. What did you last read that specifically related to positioning of perioperative patients? (Check more than one box if relevant)

Internal Department Policy	Systematic Reviews (e.g., Cochrane Reviews etc)	ACORN: Perioperative Nursing Standards	AORN: Perioperative Standards and Recommended Practices	Product literature	Journal or textbook	None of the above
❑1	❑2	❑3	❑4	❑5	❑6	❑7

Section 3: Pressure Ulcer Stages and Grading

18. Are you familiar with the staging / grading of pressure ulcer development as described in the literature? (Check one box only)

Yes, I can describe the stages / grades of pressure ulcer development, from 1 to 4	Yes, I'm somewhat familiar with the stages	No, I could not describe the stages
❑1	❑2	❑3

19. Please place a number in each box to indicate the Pressure Ulcer Stages from 1 to 4 that you believe match each of the descriptions below.

Stage	Description	Stage	Description
	Full thickness skin loss with extensive destruction, and tissue necrosis extending to underlying bone, tendon or joint capsule		Partial-thickness skin loss or damage involving epidermis and/or dermis
	Discolouration of intact skin, including non-blanchable erythema, blue/purple and black discolouration		Full thickness skin loss involving damage or necrosis of subcutaneous tissues; but not through underlying fascia and not extending to underlying structures

20. During the patient's journey through the operating suite, you are the first person to identify that the patient has developed a **Stage 1** pressure ulcer on the heels. Please list the actions you will take to manage this change in the patient's status. (Check more than one box if relevant)

Rub / massage the area	**Elevate the area**	**Place an occlusive dressing on the area. For example: 'Opsite'**	**Mark the area of tissue damage**	**Reposition onto doughnut air pillow**
❑1	❑2	❑3	❑4	❑5

Keep the area moist	**Place a Hydrocolloid dressing on the area example 'Comfeel'**	**Notify the nurse at handover**	**Notify the hospital wound care CNC**	**Notify the surgeon**
❑6	❑7	❑8	❑9	❑10

Document in the notes / charts	**Complete an incident report**	**Re-assess the patient's PI Risk Assessment Score**	**None of the above**
❑11	❑12	❑13	❑14

21. During the patient's journey through the operating suite, you are the first person to identify that the patient has developed a **Stage 2** pressure ulcer on their buttocks. Please list the actions you will take to manage this change in the patient's status. (Check more than one box if relevant. Please provide details where relevant.)

Rub / massage the area	**Reposition patient onto their side**	**Place an Occlusive dressing on the area Example, 'Opsite'**	**Mark the area of tissue damage**	**Reposition onto donut air pillow**
❑1	❑2	❑3	❑4	❑5

Keep the area moist	**Place a hydrocolloid dressing on the area. For example: 'Comfeel'**	**Notify the nurse at handover**	**Notify the hospital wound care CNC**	**Notify the surgeon**
❑6	❑7	❑8	❑9	❑10

Document in the notes / charts	**Complete an incident report**	**Re-assess the patient's PI Risk Assessment Score**	**None of the above**
❑11	❑12	❑13	❑14

Section 4: Policies and Guidelines

22. Are specific policies or guidelines for Pressure Ulcer Prevention and Management available in your hospital?

Yes	**No**	**Unsure**
❑1	❑2	❑3

	(go to Q.33)	(go to Q.33)

23. If yes, are these policies or guidelines easily accessible to you?

Yes	No
❑1	❑2

24.How often do you refer to these policies or guidelines? (Check one box only)

Always	Most of the time	Some of the time	Never
❑1	❑2	❑3	❑4

25. Are specific policies or guidelines for Surgical Patient Positioning available in your hospital?

Yes	No	Unsure
❑1	❑2	❑3

26. If yes, are these policies or guidelines easily accessible to you?

Yes	No
❑1	❑2

27. How often do you refer to these policies or guidelines? (Check one box only)

Always	Most of the time	Some of the time	Never
❑1	❑2	❑3	❑4

Section 5: Assessment of risk, management and communication of assessment/treatment and interventions

28. Do you assess patients in your care for pressure ulcer risk? (Check one box only)

Always	Most of the time	Some of the time	Never
❑1 (go to Q.21)	❑2 (go to Q.20)	❑3 (go to Q.20)	❑4

29. If not, why not? (Check more than one box if relevant.

Not enough time	Not a priority	Lack of confidence	Not familiar with paperwork	None of the above
❑1	❑2	❑3	❑4	❑5

30. How do you assess patients in your care for pressure ulcer risk? (Check more than one box if relevant.)

Use my judgement	Use PI risk assessment tool	None of the above
❑1	❑2	❑3

31. Where is the pressure injury risk assessment score documented in the patient's notes? (Check more than one box if relevant)

Patient's progress notes	**Clinical Pathway**	**Preop Checklist**	**Unsure where**	**I didn't know the score was documented in the notes**	**None of the above**
❑1	❑2	❑3	❑4	❑5	❑6

32. How often do you use the pressure injury risk assessment tool? (Check one box only)

Always	**Most of the time**	**Some of the time**	**Never**
❑1	❑2	❑3	❑4

33. How likely are you to complete the pressure injury risk assessment score in the following situations? (Please Check one box on each line).

	Highly likely	**Likely**	**Neither likely nor unlikely**	**Unlikely**	**Highly unlikely**	**N/A in my role**
On admission of the patient to the operating suite	❑1	❑2	❑3	❑4	❑5	❑6
On transfer of the patient to the operating room	❑1	❑2	❑3	❑4	❑5	❑6
On transfer of the patient to recovery	❑1	❑2	❑3	❑4	❑5	❑6
On discharge of the patient from recovery	❑1	❑2	❑3	❑4	❑5	❑6
Whenever the patient is repositioned	❑1	❑2	❑3	❑4	❑5	❑6
Whenever the patient's condition changes	❑1	❑2	❑3	❑4	❑5	❑6
Whenever pressure damage is identified	❑1	❑2	❑3	❑4	❑5	❑6

34. On admission of a patient to the operating suite, how likely is it that you would participate in the following actions as part of nursing handover? (Please Check one box on each line).

	Highly likely	**Likely**	**Neither likely nor unlikely**	**Unlikely**	**Highly unlikely**	**N/A in my role**
The patient's PU risk assessment score is sighted in the notes	❑1	❑2	❑3	❑4	❑5	❑6
The patient's PU risk assessment score is reported verbally	❑1	❑2	❑3	❑4	❑5	❑6
The patient's PU risk assessment score is calculated during handover	❑1	❑2	❑3	❑4	❑5	❑6
The patient's PU risk assessment score is calculated and documented in the notes during handover	❑1	❑2	❑3	❑4	❑5	❑6
Documentation of the patient's skin condition is sighted in the notes	❑1	❑2	❑3	❑4	❑5	❑6
The patient's skin condition is reported verbally	❑1	❑2	❑3	❑4	❑5	❑6

The patient's skin condition is examined during handover	❑1	❑2	❑3	❑4	❑5	❑6
The patient's skin condition is examined and documented in the notes during handover	❑1	❑2	❑3	❑4	❑5	❑6

35. On transfer of a patient from the operating room to recovery, how likely is it that you would participate in the following actions as part of nursing handover? (Please Check one box on each line).

	Highly likely	**Likely**	**Neither likely nor unlikely**	**Unlikely**	**Highly unlikely**	**N/A in my role**
The patient's PU risk assessment score is sighted in the notes	❑1	❑2	❑3	❑4	❑5	❑6
The patient's PU risk assessment score is reported verbally	❑1	❑2	❑3	❑4	❑5	❑6
The patient's PU risk assessment score is calculated during handover	❑1	❑2	❑3	❑4	❑5	❑6
The patient's PU risk assessment score is calculated and documented in the notes during handover	❑1	❑2	❑3	❑4	❑5	❑6
Documentation of the patient's skin condition is sighted in the notes	❑1	❑2	❑3	❑4	❑5	❑6
The patient's skin condition is reported verbally	❑1	❑2	❑3	❑4	❑5	❑6
The patient's skin condition is examined during handover	❑1	❑2	❑3	❑4	❑5	❑6
The patient's skin condition is examined and documented in the notes during handover	❑1	❑2	❑3	❑4	❑5	❑6

36. On discharge of a patient from the operating suite / recovery, how likely is it that you would participate in the following actions as part of nursing handover? (Please Check one box on each line).

	Highly likely	**Likely**	**Neither likely nor unlikely**	**Unlikely**	**Highly unlikely**	**N/A in my role**
The patient's PU risk assessment score is sighted in the notes	❑1	❑2	❑3	❑4	❑5	❑6
The patient's PU risk assessment score is reported verbally	❑1	❑2	❑3	❑4	❑5	❑6
The patient's PU risk assessment score is calculated during handover	❑1	❑2	❑3	❑4	❑5	❑6
The patient's PU risk assessment score is calculated and documented in the notes during handover	❑1	❑2	❑3	❑4	❑5	❑6
Documentation of the patient's skin condition is sighted in the notes	❑1	❑2	❑3	❑4	❑5	❑6
The patient's skin condition is reported verbally	❑1	❑2	❑3	❑4	❑5	❑6

The patient's skin condition is examined during handover	❑1	❑2	❑3	❑4	❑5	❑6
The patient's skin condition is examined and documented in the notes during handover	❑1	❑2	❑3	❑4	❑5	❑6

37. Do you liaise with anyone for advice on management of patients at risk of pressure ulcers? (Check one box only)

Always	**Most of the time**	**Some of the time**	**Never**
❑1	❑2	❑3	❑4

38. Do you have equipment /devices to assist you to lift /position patients in your department?

Yes	**No**	**Unsure**
❑1	❑2	❑3

39. Approximately, how often are patients repositioned intraoperatively? (Check one box only)

1hrly	**2-4hrly**	**8hrly**	**PRN**	**Unsure**
❑1	❑2	❑3	❑4	❑5
It's usually not possible to reposition patients intraoperatively	None of the above			
❑6	❑7			

40. Approximately, how often are patients repositioned *postoperatively* in recovery? (Check one box only)

½ hourly	**PRN**	**Unsure**	**It's usually not necessary to reposition patients**	**None of the above**
❑1	❑2	❑3	❑4	❑5

41. What PU interventions and devices do you use most frequently for reducing / relieving patients' pressure? (Check more than one box if relevant)

Miscellaneous:

Pillows	**Towels**	**Blankets**	**Doughnut air pillows**	**Water-filled gloves**
❑1	❑2	❑3	❑4	❑5

Rings / Pads / Cushions:

Sheepskin	**Foam**	**Egg crate**	**Beanbag**	**Gel**
❑6	❑7	❑8	❑9	❑10

Table Overlays:

Sheepskin	**Foam**	**Egg crate**	**Beanbag**	**Gel**
❑11	❑12	❑13	❑14	❑15

Mattresses:

KCI RIK	**ROHO**	**None of the above**
❑16	❑17	❑18

Appendix F: Permission to use survey tool

From: **Sandy Middleton** <Sandy.Middleton@acu.edu.au>
Date: Mon, Jun 10, 2019 at 10:35 PM
Subject: Re: Survey instrument
To: Arita Martins <martins.arita1@gmail.com>
Cc: Cintia Martinez <Cintia.Martinez@acu.edu.au>

Dear Alida
Happy to share this survey. Cintia, can you please send this. Alida, Cintia is away on leave this week so she won't be able to send this until next week.

Alida, would you mind citing our paper to acknowledge use of our tool in any arising publication. Best of luck with your studies.

With thanks

Sandy Middleton

On 11 Jun 2019, at 3:15 am, Arita Martins <martins.arita1@gmail.com> wrote:

Dear Sandy,

My name is Alida Martins and is currently doing my Master's degree in Nursing at the Department of Nursing and Midwifery Stellenbosch University, Cape Town, South Africa. I am however working in Saudi Arabia. I came upon your research article "Peri-operative nurses' knowledge and reported practice of pressure injury assessment and prevention: A before-after intervention study." I would like to know if it is possible to give me more information on the survey instrument tool you used and the possibility of using it in my study.

In the background of your study, you mentioned that educational interventions on peri-operative nurses' knowledge and reported practices are scarce. I agree with this statement and that it has not changed much since the article was published. A lot of research has been done on pressure injury and nerve damage but not much on the effect of positioning and the impact it has on the patients. I have observed that a lack of knowledge is a concern when it comes to basics. I am employed in a multicultural environment where the nurse's country of origin's training on the prevention of peri-operative pressure injury appears to differ,

If you agree to me using your survey instrument, please send it to my email address.

Kind regards
Alida M. Martins

Sally SF <sally@healtheducationaustralia.com.au> Sun, 13 Oct 2019, 06:42

to martins.arita1, Middleton

Hello Arita,

Thank you for your emails and interest in the PI research study we conducted between 2008-10.

(Hi to you too Sandy and thank you for passing these emails onto me!).

I am replying from my other email which I use daily, so I can respond sooner in any further conversations we have about our common research interests.
I can confirm Sandy's original comments that we did face validity tests for the survey.

I started by circulating my draft survey questions to a group of experts - all being experienced perioperative nurse educators working in a large local health district of Sydney, comprising more than 6 hospitals (both public and private).

I asked the educators a series of questions (general and specific) about the draft survey questions - see below

Pilot Feedback Prompts / Questions

General

1. How long did it take you to complete the questionnaire?
2. Were the instructions clear / easy to follow?
3. Was the font size adequate?
4. Was there sufficient space to write your answers?
5. Were there any spelling errors or typos?

Specific

6. Were there any questions with missing options?
7. Were there any questions that overlapped or were repetitive?
8. Were there any omissions – questions you think should be included?
9. Was there anything else you'd like to add?

I made changes in response to their feedback and recirculated the draft for a second round of piloting using the same questions above.

I've just looked back at the file dates and there was 15 months between the date of my first survey questions and my final survey used in the study following testing and revision. I was working on other projects in my role at the time, but it is a reminder to me of the time I took as a beginning researcher to complete things!

I recall when I was just beginning to explore the topic of nurses' knowledge, I was very interested in Barbara Pieper's work and the pressure ulcer knowledge tool (PUKT) she developed with various co-authors (including Mott 1995, Mattern 1997 and more recently Zulkowski, 2014 onwards - see this

link to her recent work Ovid Technologies, Inc. Email Service http://acs.hcn.com.au?acc=36422&url=http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=ovft&AN=00129334-201409000-00005&PDF=y).

Pieper's original tool was a 47-item T/F knowledge test.

This testing approach produces a score of knowledge at the end, so it is quite different from our approach which was a survey of nurse's knowledge and their reported clinical practices with PI prevention. It seems to be a commonly formed view that studies of nurses' PI knowledge will have used a test similar to Pieper's.

Anyway, I hope this is helpful and answers your questions about the validity testing of the survey used in our study.

Please don't hesitate to contact me directly via this email if there's anything else you want to clarify.

Very best wishes with your research endeavours!

Sally

Sally Sutherland-Fraser
M 0417 480662

ABN 49 606 435 214
A PO Box 77 Leichhardt NSW 2040 Australia
W www.healtheducationaustralia.com.au
E sally@healtheducationaustralia.com.au

Appendix H: Language editing

West Coast Copy Editing and Formatting Services

PO Box 3
Suffren St
Langebaan
7357
2 November 2021

Ms AM Martins
PO Box 570 Dhahran
KSA 31932
Student number: 12550590 / Stellenbosch University

The above-named student's thesis "Knowledge and clinical practices related to perioperative pressure injuries in a Middle Eastern hospital" was re-edited for grammar, spelling, syntax and referencing according to Harvard.

The revisions were recommended for the author's attention and integration in the final document. Formatting errors may have occurred during internet file transfers from the editor to the author. The author was responsible for checking for such manifestations and making the necessary adjustments.

T. Pfeffer.

Appendix I: Technical formatting

Lize.net
COMMUNICATION (Pty) Ltd
Company registration: 2019/050723/07

To whom it may concern

This letter serves as confirmation that I, Lize Vorster, performed the technical formatting of Alida Margaretha Martins's thesis entitled:

Knowledge and clinical practices related to perioperative pressure injuries in a Middle Eastern hospital

Technical formatting entails complying with the Stellenbosch University's technical requirements for theses and dissertations, as presented in the Calendar Part 1 – General or where relevant, the requirements of the department.

Yours sincerely

Lize Vorster
Language Practitioner

The Tasting Room, Uitzicht Farm, Stellenbosch, 7600 * e-mail: lizevorster@gmail.com * cell: 082 856 8221